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ALPINE FLOWERS

THE MOST COMMON ALPINE PLANTS OF SWITZERLAND, AUSTRIA, AND BAVARIA

BY

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AUTHOR'S PREFACE

In the Alps no keen lover of nature can help becoming an enthusiastic botanist. Next to the grand mountain scenery, what strikes him most is the unfamiliar plant life, with its wealth of colour and strangeness of form. Thus every year thousands come to revel in the glowing beauty of the flowery meadows and rocky slopes of our mountains, and the flora of the Alps has for long been one of the chief delights of all nature-lovers.

My hope is that they may find this little book a pleasant and welcome companion, which will enable them to make the acquaintance of the best-known flowers of the Alps.

GUSTAV HEGI.

ZÜRICH, *October, 1929.*

PUBLISHERS' NOTE

In this translation of the sixth German edition of *Alpenflora* (Verlag J. F. Lehmann, Munich, 1927), the German names and name-index, as well as the numerous local names for certain plants, have been retained. English names have also been given where possible, while the names of plants occurring in the British Isles have been marked with an asterisk. The terminology has deliberately been kept as simple and non-technical as possible, and a glossary of botanical terms used in the text has been added. The terms *Voralpen*, *Hochalpen*, have been translated *lower alps*, *high alps*, respectively.

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Coníferae. Conifers

Mostly evergreen trees or shrubs, usually with stiff, narrow, one-veined, needle- or scale-shaped leaves. Stem branching regularly. Flowers unisexual, monoecious or dioecious, naked, i.e. without a perianth. Male flowers usually form a catkin. Stamens shield-shaped, with two or more one-celled anthers on the under side. Female flowers very often form a cone. Scales of cone scale-shaped or shield-shaped, sometimes divided into ovuliferous scales and bract scales, with one or many naked ovules. Seeds often winged. Embryo with two or many cotyledons, which turn green even in the dark. The pollen is carried to the ovules by the wind (wind-fertilization).

Fig. 1. **Lárix decídua** Mill. (= *Lárix Europǽa* DC.), *Lärche*, Larch.*

Larch, Larchbaum, Steinlärche (Tirol), Lärbaum, Lärket (Bavaria), Lergat, Lerchoch (Carinthia), Löhrer (Styria), Leerbam, Lera, Lierbaum (Lower Austria), Lortänne (Appenzell), Lerch (Davos), Lertschine, la larze (Valais), Laresch, Larsch, Laras (Romansch-speaking Grisons).

A deciduous tree, which may be as much as 180 ft. high and 5 ft. in diameter, with a straight stem and pyramidal head. Main branches spreading horizontally, bent upwards at the ends; smaller branches drooping. Young shoots light yellowish-green. Leaves bunched together on short shoots, 25–64 (49 on the average) at a time, ·8–1·6 in. long. Cones small, egg-shaped, light brown, with thin, slightly tapering bract scales, which are purplish-red at flowering time; bract scales much longer than the light green ovuliferous scales. Seed of a rich brown colour, ·12–·16 in. long, with a semi-elliptical wing, which may be as much as ·5 in. long and ·2 in. broad. Flowers from April to June.

The larch is indigenous to the Alps and Carpathians, where it forms extensive open woods between 2950 and 7850 ft. It is also very frequently planted as an ornament or for timber. In earlier times it was much more widely distributed in Northern and Eastern Europe, as is shown by its use in old buildings (especially churches).

Sheep and cattle are very fond of larch twigs. The resinous and very lasting timber is used for various purposes, e.g. in building under water, for masts, mash-tuns, water-pipes, roof shingles, &c. The resinous sap ("Venice turpentine") is also collected in many places, especially in Southern Tirol.

Fig. 2. **Juníperus nána** Willd., *Zwerg-Wacholder*, Dwarf Juniper.*

Jochbranebitt, Jochkranwit, Jochmind (Tirol), Kromzach (Lower Inntal), Almkranabet, Kreuzbeeren (Carinthia), Giop, Güp, Ginaiver, Parmuoglia, Brinscier (Romansch-speaking Grisons), Räckholdere (Valais), Räggholder (St. Gallen).

A prostrate shrub, usually forming a dense, rough, interlacing carpet on the ground, less frequently ascending, rising to a height of 20 in. Branches short and thick, often crooked. Leaves ·16–·32 in. long, boat-shaped, usually inclined to curl inwards, ending in a bluntish spike. Flowers dioecious. Berry-like fruit bluish-black, about as long as the needles bearing it, covered with bloom, with a 3-rayed furrow at the top.

The Dwarf Juniper is merely an alpine variety of the Common Juniper * (*J. commúnis*), found in the plains. This is shown not only by the existence of intermediate forms (var. *intermédia* Sanio), but by the fact that specimens of the Dwarf Juniper cultivated in the plains gradually become more and more like the Common Juniper.

Dry, poor pastures and stony slopes in the Alps and Jura, common from about 5600 to 8200 ft., occasionally ascending to 12,300 ft., sometimes descending to 2450 ft. in the valleys of the Alps and Carpathians.

Alps, Carpathians, Riesengebirge, East Prussia (on the plains), Arctic regions, Caucasus, Himalayas.

The Dwarf Juniper provides herdsmen with valuable firewood and is also used for smoking meat. It is definitely harmful in pastures because it keeps down the growth of the grass. It is avoided by cattle.

Fig. 3. **Pínus montána** Mill., *Berg-Föhre*, *Krummholz*, *Knieholz*, *Legföhre*, *Latsche*, Mountain Pine.

Leckern, Serpe, Zerbet (Lower Austria), Löcken, Leggen (Salzburg, Upper Styria), Leckerstaude (Styria), Fohren, Sonderumen (Vorarlberg), Latsche, Lägken, Spirke, Dufe, Zunder, Kuscheln und Filzkoppe (Upper Bavaria), Lackholz, Löckern, Au-Föhre (Böhmerwald), Arle (Bregenzerwald, Tirol, Grisons), Taufern, Tüfern, Daofra (Algäuer Alps), Zetten (Lower Inntal, Carinthia, Pustertal), Sprinzen (Pustertal), Reischten (Southern Tirol), Zuondra, Muf, Agnon, Anier, Zundregn, Burschina (Engadine), Truosa (St. Gallen), Flatzarve (Uri), Zungrign (Bergün), Barancia (Ampezzo), Barancle (Buchenstein), Allazz, Russe (Friaul), Mugoff, Muffol (Val Tellina).

Growing like a tree, erect (up to 30 ft. high), with a definite stem and pyramidal head (*Spirke*), or like a shrub, straggling along the ground (*Legföhre*, *Latsche*). Bark brownish-grey, not scaling off. Leaves green on both sides, often bent like a sickle and imbedded in pairs in a sheath. Ovuliferous scales at the top with pyramidal scale shields (*apophyses*), bearing the raised warty umbo, surrounded by a black ring, in the middle. Cones bright brown or yellowish-brown, occasionally green, often covered with bloom; young cones erect, violet, the older ones almost or quite sessile, standing erect or hanging down obliquely. Seeds winged. Flowers in May and June.

The Mountain Pine forms extensive woods at sub-alpine and alpine levels in the whole chain of the Alps and Carpathians, up to 7775 ft. It also occurs in the Böhmerwald, the Riesen-, Erz-, and Fichtelgebirge, and the Black Forest, as well as on damp heaths in the foothills and plateaux. In addition it is frequently planted (even on sand-dunes) and hence is apparently indigenous in many places, e.g. near Bremen, in Oldenburg, on the Inselberg in Thuringia, in Upper and Lower Franconia, on the Görlitzer Heide, &c. It is usually absent from primary and schistose rocks, where it is replaced by the Green Alder (*Alnus viridis*, *Alpen-Erle*).

The erect Mountain Pine is distinguished from the Scots Pine * (*Pinus silvestris* L.) by its pointed hemispherical top, dark bark throughout, resinous (not resinless) buds, almost sessile, erect or obliquely-hanging ripe cones, and shining scale shields, which are usually dark brown.

Three varieties (*uncináta*, *Pumílio*, and *Múghus*) can be distinguished by the structure of their cones and scale shields; they are not sharply defined, however, but gradually pass into each other, so variable is the Mountain Pine in its development.

In the Alps the shrubby form provides protection against avalanches. The tough, pliable, resinous wood supplies herdsmen with firewood and chunks for lighting. Pine oil, which is a valuable drug (especially for rheumatic affections), is obtained by distillation. In the Riesengebirge mementos carved from pinewood are sold.

Fig. 4. **Pínus Cémbra** L., *Zirbelkiefer*, *Arve*, *Zeder-Fichte*, Arolla Pine or Siberian Stone Pine.

Zirschen, Zirm, Zirmnussbaum (Eastern Alps), Arbä, Arbest (St. Gallen), Schember, Araf [the cone, Betschla, Nuschpinas, Nuschella] (Romansch-speaking Grisons), Zimber, Pigneu, Gémbro (Ticino), Gembar, Gembru (Poschiavo).

A tree with an erect stem and pyramidal top, as much as 60 (or even 75) ft. high. Bark remaining smooth for a long time, brown. Young shoots rusty yellow, downy. Needles stiff, 2–3·5 in. long, usually in fives, forming whorls. Cones short-stalked, blunt, 2–3 in. long and 1–2 in. broad, erect or projecting, egg-shaped to oblong-eggshaped, violet when unripe, cinnamon brown when ripe. Seeds the size of hazel-nuts, with no wing at all, edible. A form with yellowish-green cones, var. *Helvética* Clairv., occurs in the Engadine and Val Tellina. Flowers in June and July; the fruit, however, is not ripe till the autumn of the following year.

Forms open woods in the Alps and Carpathians, from 5250 to 8200 ft., and is also frequently found growing along with larch and spruce. Prefers the Central Alps. Occasionally planted in the lowlands for ornament.

The light, resinless, pleasant-smelling wood is frequently used for panelling walls. The sweet-tasting seeds (*Zirbennüsschen*, cedar or cembra nuts) are edible and are used in confectionery or as food for birds. The tree may attain the age of 700 years.


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Gramíneae. Grasses

The Grasses are distinguished by their stem or so-called " culm ", which is usually hollow, circular, tapering, and jointed at the nodes. The leaves are divided into the " sheath ", which is usually split all the way down and clasps the stem, the small " ligule ", often imperfectly developed, which is situated at the junction of the sheath and the lamina, and the more or less broad " blade " or " lamina " itself. The arrangement of the leaves is strictly distichous, i.e. they are placed in two longitudinal rows along the culm. The flowers, which are usually bisexual, grow in spikelets; these are either stalkless, being sessile on the main stem (cereals, as e.g. in wheat, rye, barley, and the various species of rye-grass), or long-stalked, forming a panicled inflorescence (meadow-grasses). The individual flowers are imperfect; in particular, they have no beautifully-coloured petals. In the Grasses these are replaced by small chaffy glumes. Stamens usually 3; stigmas 2. Fruit a one-seeded dry achene. The majority of alpine grasses form excellent fodder, and are prominent constituents of the many-coloured carpet of alpine meadows and pastures.

Some grasses, like the Alpine Meadow-Grass * (*Poa alpina* L.) are very widely distributed and belong to the class of " arctic-alpine " or " glacial " plants. They extend right round the northern hemisphere and are found on nearly all the mountain ranges of the north temperate zone. A few species also appear on the mountains of the southern hemisphere, e.g. on the Andes of South America, in Tierra del Fuego, &c.

Fig. 1. **Deschámpsia** (= *Aira*) **flexuósa** Trin., *Draht-* or *Flatterschmiele*, Wavy Mountain Hair-Grass.*

12–28 in. high, forming loose turf. Rootstock creeping, usually sending out numerous smooth stems. Leaf-blades folded together to form bristles. Panicle close before flowering, expanding later. Branches of panicle as much as 3 in. long, usually sinuous. Spikelets of 2 flowers, ·2 in. long, of a light brownish colour, usually streaked with violet like the branches of the panicle. Awns of flowering glumes distinctly twisted and abruptly bent, much longer than the spikelets. Flowers from June to August.

In dry woods, on humus in thickets of *Alpenrosen* and juniper, on dry hills and mountain meadows, in clefts of rocks, and in peat bogs, from the plains to the level of the alps, to 8800 ft.; locally, especially on non-calcareous subsoils, it covers great expanses almost by itself. The plant is one of the *Hungergräser*, i.e. grows even on very poor soil.

Almost all over Europe, Arctic regions, Asia Minor, Caucasus, Japan, North America, and on the peaks of South America.

The closely-related Tufted Hair-Grass * (*Deschámpsia caespitósa* P. Beauv., *Gemeine Rasenschmiele*) has flat leaves, which are rough on the upper surface, owing to the sharply keeled ribs.

Fig. 2. **Avéna Scheuchzéri** All. (= *A. versicolor* Vill.), *Bunter Hafer*.

6–20 in. high. Rootstocks forming turf. Leaves linear, fairly smooth above, with a transparent white border. Panicle short and close, broad, almost egg-shaped. Lower branches of panicle in twos, usually bearing only one spikelet. Spikelets fairly large, with 5 flowers, variegated, mottled with brown, yellow, and purple (the so-called " flower " of the grass). Awns dark-coloured, as much as 4 in. in length. Flowers in July and August.

Fairly common in dry meadows, rocky places, and *Ericaceae* thickets in the higher alps, from about 5900 to 9850 ft., especially on primitive rocks. Pyrenees, Alps, Carpathians, Siebenbürgen, Caucasus, Altai Mountains. The species is a characteristic feature of the vegetation of accumulations of humus on ridges and mountain crests, and often forms the predominating constituent of sheep pastures.

Fig. 3. **Póa alpína** L., *Alpen-Rispengras*, Alpine Meadow-Grass.*

Ritschgrasl (Zillertal), Kühschmelchen (Eastern Tirol, Salzburg), Romeyen (Bregenzerwald), Gfählschmäleli, Heuschmälae, Stoffel, Wildgras, Hälmgras, Zwiebelgras, Fatsch, Adelgras, Schluhigras (Switzerland), Awiklgras (Lower Austria).

This grass forms large firm tufts. The side shoots are enclosed at the foot in leafy sheaths which persist for a long time, so that the foot of the stalk takes on a bulbous appearance. Plant usually greyish-green, with few leaves, as much as 20 in. high. The individual spikelets are many-flowered (5–10), usually mottled greenish-yellow and reddish-violet, more rarely green all over. As regards reproduction, two forms may be distinguished. One, the seed-bearing or fruiting variety (var. *fructífera* or *seminífera*, fig. 3*a*), has normal seed-bearing spikelets, while in the other, the viviparous variety (var. *vivípara*, fig. 3*b*), the spikelets develop into buds the size of a leaf, the so-called " bulbils ", which very soon become detached from the parent plant, fall to the ground, throw out roots, and grow into new plants. In this way the plant gets out of the troublesome process of seed formation altogether. It has been shown by experiment that the two forms are constant, i.e. by sowing bulbils we obtain the viviparous form almost exclusively (up to 90 per cent), but from seeds, on the contrary, we obtain only normally developed, seed-bearing plants. Sometimes the variety *vivípara* is found in great stretches by itself. Flowers from May to September.

Very common on rich meadows and pastures, on scree slopes, and on alluvial soil at sub-alpine and alpine levels, from about 4600 to 8200 ft.; occasionally rising even higher, to 11,900 ft. (Monte Rosa in the Valais), and sometimes, especially along river courses, descending to the plains, e.g. to 650 ft. in Southern Tirol.

Widely distributed over almost all the mountain ranges of the northern hemisphere, and in the Arctic zone.

This grass is one of the most valuable of odder plants.

Fig. 4. **Agróstis alpína** Scop., *Alpen-Straussgras.*

A graceful low-growing grass usually forming thick turf, 4·5–12 in. (more rarely as much as 16 in.) high. Leaves usually folded together to form bristles; the stem-leaves, however, sometimes have their blades spread out flat. Old leaf-sheaths forming a thick brown tangle of fibres. Inflorescence panicled, close before and after flowering time, but open and widely extended during flowering. Branches of the panicle and stalks of the one-flowered, reddish-brown spikelets covered with rough hairs (easily seen with a pocket lens, especially if the panicle is held up to the light). Flowers from July to September.

Very common on dry sunny meadows rich in humus, and also on rocks of the upper sub-alpine and alpine levels, from about 5250 to 10,150 ft.; occasionally descending lower, to about 1650 ft.

Widely distributed over the whole Alpine system of Europe, from the mountains of Spain to Lower Austria and Carniola, also in the Jura (here only the sub-species *Schleichéri* is found), the Sudetes (Grosser Kessel), the Northern Carpathians and the Apennines. On limestone and primary rocks.

Agróstis rupéstris All. (*Felsen-Straussgras*), which is very like the above, has smoothly-branched panicles.

Fig. 5. **Sesléria** (= *Oreóchloa*) **dísticha** (Wulf.) Pers., *Zweizeiliges Blau-* or *Kopfgras, Kamm-Seslérie.*

Böckbüschel, Bockböscha, Fluehgras, Steigras, Streitrüben (Switzerland), Schwickenblüh (Pinzgau), Stoangrasl (Carinthia).

4–8 in. high, forming thick tufts, surrounded at the foot by the fibrous remains of the sheaths. Leaves with smooth thread-like blades folded together to form bristles. Inflorescence a panicle which may be ·6 in. long, resembling a spike (" false spike "). Spikelets turning to one side, streaked with light or dark brown, very rarely yellowish-green, with 3–5 flowers. Flowers from July to September.

On rocks, among boulders, and in dry alpine meadows, from about 6250 to 10,500 ft., but found only on primitive rocks (almost entirely absent from the Valais). In the high alps it often forms great grassy carpets, together with *Cárex cúrvula* (Plate 3, fig. 3). A good fodder plant.

Pyrenees, Alps (from Switzerland and Lombardy to Carniola), Carpathians, Siebenbürgen. In the Bavarian Alps it occurs as a rare plant in the Algäuer Alps. It is not found in Upper or Lower Austria, and is very rare in the Valais and Bernese Oberland.

A similar species, the Blue Moor-Grass * (*Sesléria caerúlea* Ard., *Echtes Blaugras*), which has a bluish bloom on the upper sides of its leaves and an oblong-eggshaped, violet or steely-blue panicle, is equally widely distributed in the alps and lower alps (but only on calcareous subsoils). See also *Festuca varia*, Plate 34, fig. 3.

Cyperáceae. Sedges

Grass-like herbaceous plants forming turf, usually preferring damp habitats. In contradistinction to the true grasses, the culms are usually solid, not hollow, without knots, three-cornered. Leaves narrow, linear, arranged in three longitudinal rows along the culm, with closed sheaths. Flowers always imperfect, usually in many-flowered spikes, heads, or corymbs, unisexual or bisexual. Perianth wanting or replaced by bristles or scales. Stamens usually 3, stigmas 2 or 3. Fruit a one-seeded lens-shaped or three-cornered achene, often enclosed in the overgrown bract (" utricle ").

The sedges are not very important as fodder plants. Some species impair the value of the fodder by keeping down the growth of the grass.

Fig. 6. **Erióphorum Scheuchzéri** Hoppe, *Scheuchzer's Wollgras.*

A plant 4–14 in. high, throwing out runners. Stem perfectly circular, tapering, smooth. Leaves rush-like, smooth, those on the stem very short and often reduced to the sheath only. Uppermost leaf-sheath usually has a short blade. Flowers bisexual. Inflorescence solitary, terminal, globular. Flower bristles numerous, growing into long snow-white hairs after flowering-time, later falling off with the fruits.

Marshy places in the alps; fairly common from 4900 to 8550 ft. A peat-forming plant.

Pyrenees, Alps (from the Maritime Alps to Styria, Carinthia, and Salzburg), Carpathians, Siebenbürgen, eastern and western Arctic regions, Himalayas.

The other Cotton-grasses of the Alps are distinguished by the following characteristics:

The Hare's-tail Cotton-grass * (*Erióphorum vaginátum* L., *Scheiden-Wollgras*) forms thick, dense tufts and has a solitary white terminal flower-spike. The sheath of the stem-leaves is swollen.

The Alpine Cotton-grass (*Erióphorum* (= *Trichóphorum*) *alpínum* L., *Alpen-Wollgras*), has spikelets of only a few flowers with curly woolly hairs and small white terminal flower-heads.

The narrow-leaved and broad-leaved varieties of the Common Cotton-grass * (*Erióphorum angustifólium* Roth (= *E. polystáchyon* L.), *Schmalblätteriges Wollgras*, and *E. latifólium* Hoppe, *Breitblätteriges Wollgras*) are easily recognizable by their numerous white drooping woolly heads. The first species has only a few (3–5) smooth-stalked spikes; the second, on the contrary, has 5–12 rough-stalked spikelets.


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Cyperáceae. Sedges (*Continued*)

Fig. 1. **Cárex ferrugínea** Scop., *Rostfarbige Segge.*

12–24 in. high. Shoots all emerging together, often forming long underground creeping runners which are fairly thin and have red sheaths. Scales at base of stem finally becoming dark brown fibres. Culm lateral, with numerous sheathing leaves of a bright rusty red. Female spikes 2–4, stalked, usually nodding or drooping from the first; male spike terminal, nodding. Flowering glumes egg-shaped, brown with a light streak down the middle. Stigmas 3. Flowers from June to September.

Fairly common in steep wet watercourses, in damp meadows, on grassy slopes and shady places in the alps and lower alps, from about 3300 to 8200 ft., sometimes descending lower (in Southern Tirol to 1025 ft.).

Pyrenees, Northern Apennines, Alps, Swiss Jura, Siebenbürgen, Caucasus.

Fig. 2. **Cárex sempérvirens** Vill., *Immergrüne* or *Horst-Segge.*

4–20 in. high. Growth dense and turfy, forming tufts. Shoots all sheathed. Culm central. Leaves narrow and linear, almost always flat. Sheaths of radical leaves forming a tuft of fibres, lateral shoots wrapped in a dark reddish-brown shining bundle of fibres. Female spikes 2–3, always erect, loose; male spike terminal, long-stalked. Stigmas 3. Flowers from June to August.

Very widely distributed on dry sunny slopes, meadows, and heaps of debris in the alps and lower alps, from 5600 to 9850 ft.; not infrequently descending lower, as e.g. on the heathy pastures and dry coniferous woods of the Bavarian Plateau.

Pyrenees, Alps, Jura, Schwäbische Alb, Carpathians, Italy, northern parts of the Balkan Peninsula. Found on limestone and primitive rocks, but definitely preferring dry places.

Irrigation and manuring drive the plant away. It is an important hay plant and forms the main part of the natural haycrop (*Wildheu*).

Fig. 3. **Cárex cúrvula** All., *Krumm-Segge.*

A low-growing plant, 1–4 in. high, forming dense turf, with smooth three-cornered stems bending upwards in a curve or erect, covered at the foot with the remains of last year's leaves. Leaves bristle-like, with hollow channels, rough, bending backwards. Inflorescence a dark brown, oblong, head-like spike with a single small dark brown bract, which bears the female spikelets on its under side, and the male spikelets on its upper. Utricles two-keeled, almost winged. Stigmas 3. Flowers in July and August.

Stony places in the high alps, in dry places rich in humus, marshy meadows, flat ridges, and clefts of rocks, between 6250 and 9850 ft.; often covering a great expanse (*Curvulétum*). Only on non-calcareous subsoils; hence it is unknown in almost all parts of Bavaria and in Lower Austria.

Pyrenees, Alps, Carpathians, Siebenbürgen, Banat, Balkan Peninsula.

Fig. 4. **Cárex firma** Host, *Feste* or *Polster-Segge.*

2–8 in. high, forming dense, compact, hemispherical tussocks; no runners. Shoots sheathed as in *Carex sempervirens*, but the leaves

are much shorter, stiffer, and closer, spreading horizontally. Stem with three blunt edges, almost leafless. Female spikes usually 3 in number, rarely 1 or 2, with few flowers but many seeds; male spike terminal, stalked. Stigmas 3. Flowers from June to August.

Very common on rocks and mountain ridges, as well as on the poor stony ground of limestone mountains, between 5250 and 9500 ft., sometimes descending the valleys to 1650 ft.; often forming a great expanse (*Firmétum*). The species is one of the highest-growing alpine plants.

Pyrenees, Alps, Carpathians, Siebenbürgen.

Fig. 5. **Cárex atráta** L., *Trauer-* or *Geschwärzte Segge*, Black Sedge.

6–20 in. high, forming turf or throwing out very short runners. Upper part of stem sharply three-cornered. Leaves linear, ·12–·28 in. broad, with narrow channelled points. Spikelets 3–5, fairly thick, short and cylindrical. Lowest bract resembling a leaf. Flowering glumes oblong-eggshaped, tapering, blackish-violet with a green streak down the middle. Utricles usually yellowish-brown, with short beaks. Stigmas 3. Flowers from June to August.

Very widely distributed on pastures, amongst mountain pine, on accumulations of humus, and in clefts of rocks of the alps and high alps, from about 4900 to 10,150 ft., especially on limestone.

Pyrenees, Central France, Alps, Riesengebirge, Gesenke, Carpathians, Balkans, northern and Arctic regions.

Fig. 6. **Cárex capilláris** L., *Haarstiel-Segge*, Capillary Sedge.*

A graceful little plant, 2–12 in. high. Stem with leaves on its lower part only. Leaves much shorter than the stem, linear, flat, fairly stiff. Bracts with a long sheath, resembling leaves. Male spikes solitary, stalked; female spikes 2–3, loose, nodding, on thin thread-like stalks, the two upper opposite, overlapping the male spike, the third usually at some distance. Utricles three-cornered, gradually tapering to a beak. Stigmas 3. Flowers from May to July.

Stony, wet or dry meadows and slopes of the alps and lower alps; fairly common between 4900 and 9500 ft., occasionally descending lower (to 2800 ft.) on marshy heaths.

Pyrenees, Alps, Riesengebirge, Moravian Mountains, East Prussia (Ragnit district), Carpathians, Caucasus, Northern Europe, Arctic regions, Urals, Altai Mountains.

Fig. 7. **Cárex Baldénsis** L., *Monte Baldo-Segge*.

6–10 in. high, greyish-green, forming loose tufts. Culm erect, slightly three-cornered. Leaves all springing from the root, fairly stiff, with rough edges, wrapped at the base in the dead leaves of the previous year. Spikelets whitish, crowded together into a head; the latter is surrounded by 2–3 leafy bracts, which project horizontally or are bent backwards. Spikelets male at the top, female below. Utricles dark brown, without beaks. Stigmas 3. Flowers in July and August.

On dry stony slopes and boulders, from about 500 to 7850 ft. On calcareous soil.

Fairly widely distributed in the Southern Alps between the Lake of Como and Val Sugana, also in the Eastern Grisons (Ofen Pass) and Upper Bavaria (on the Loisach and Neidernach near Griesen above Garmisch).

Apart from these seven species, the genus *Cárex* is represented in the Alps and northern and arctic regions by a fairly large number of interesting types, some of which are very pretty.


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Liliáceae. Lily Order

Perennial plants, less frequently shrubs or trees, with tubers, bulbs, or strong cylindrical underground stems (rhizomes) and terminal inflorescences. Stem usually simple and unbranched. Flowers usually bisexual, regular, with their parts in threes, as a rule vividly and beautifully coloured. Perianth (perigone) single, almost always consisting of six divisions (petals) of the same shape and colour. Stamens 6, arranged in two circles. Ovary superior, almost always 3-celled, containing numerous seeds. Fruit a capsule or berry.

Fig. 1. Állium Victoriális L., *Allermannsharnisch*, *Siegwurz*.

Wilder Knoblauch, Nünhemderwurz, Nünichrut, Neunhemmeler (Switzerland), Neunhäuterwurz (Tirol), Lanawurz'n, Lahnlauch (Lower Austria), Glücksmännlein (Riesengebirge).

1–2 ft. high, forming bulbs. Bulb scales extensively subdivided by a web of fibres. Lower half of stem bearing leaves, circular, tapering; upper part of stem angular. Leaves on short but definitely developed stalks, flat, broadly lanceolate or elliptic, ·8–1 in. broad. Inflorescence apparently a globular umbel, supported by a membranous sheath at the base, nodding before the flowers open. Flowers greenish-white to yellowish. Filaments longer than the blunt petals. Capsule finally bursting wide open. Flowers in July and August.

Rocky slopes, places rich in vegetation, and manured meadows of the alps and lower alps, from about 5600 to 7850 ft., occasionally descending lower, to 2360 ft.

Pyrenees, mountains of Central France, Alps, Switzerland, Jura, Vosges, Feldberg, Riesengebirge, Gesenke, Carpathians, Caucasus, Urals, Altai Mountains, North America. Prefers limestone. In folk-lore it is considered a magic plant (*Glücksalraun*) as well as a styptic.

Fig. 2. Lloýdia serótina Salisb., *Spätblühende Faltenlilie*, Mountain Lloydia.*

A delicate, graceful little plant, 2·75–4 in. high, with a small oblong bulb covered with brown membranous scales. Radical leaves usually two, grass-like, as long as the flower-stalk. Stem with a few narrow leaves, bearing a solitary erect flower at the end. Divisions of perianth spreading, white, yellow at the base, each with three reddish streaks. Capsules rounded, distinctly three-lobed. Seeds small and quite flat. Flowers from June to August.

Rocks, ridges, grassy patches, and cushions of *Azalea* in the highest alps, from 6250 to 10,150 ft.

Alps, Carpathians, Siebenbürgen, Britain (Wales), Arctic regions, Urals, Altai Mountains, Himalayas, especially on primary rocks. Not found in Upper or Lower Austria, very rare in Bavaria. See also *Paradisia Liliastrum*, Plate 34, fig. 1, and *Veratrum album*, Plate 34, fig. 2.

Iridáceae. Iris Order

This order is distinguished from the *Liliaceae* by the 3 stamens, which are placed just inside the outer perianth, and by the inferior 3-celled ovary. In alpine regions the order is represented only by the genus *Crócus*.

Fig. 3. Crócus vérnus Wulf. (= *C. albiflórus* Kit.), *Frühlings-Safran*, Spring Crocus.*

Brennwürzli, Krokùssli, Safaretblüemli, Schneechrut, Chäsli, Süchäsli, Guggasli, Fueterreif, Hutelereife, Reifenhüet, Winterbluema (Switzerland), Burzigebelen, Burzigageln (Tirol), Schneeblüemel, Blümisken (Mölltal), Zeitlos'n (Eastern Alps), Pelisken, Paternessl, Kasblüeml, Buabn und Diandln (Carinthia), Vater und Mutter (Gailtal), Paparella, Minchületta, Flur d'chavaigl, Clavs d'prümavaira, Schiomblas, Schigomuli (Romansch-speaking Grisons), Bucca neve (Ticino).

A plant 3–6 in. high, growing from a tuber, with no stem above ground. Leaves narrow, linear, grasslike, with recurved margins and a white streak down the middle. Divisions of the perianth uniting at the base to form a long tube, white or violet, or streaked with white and violet. Stigma funnel-shaped, wrinkled, 3-lobed, deep orange, shorter than the perianth. Flowers in March and April, like *Soldanella pusilla* (Plate 21, fig. 11), *Anemone vernalis* (Plate 10, fig. 5), and *Ranunculus alpestris* (Plate 11, fig. 5).

Very widely distributed in meadows and pastures from the foot of the mountains up to the level of the alps (to 8200 ft.), here and there descending lower, even to the plains. This flower is fertilized by butterflies.

Pyrenees, Cevennes, Alps, Jura, Northern Apennines, Carpathians, Balkans. As soon as the snow melts, great numbers of these delicate flowers spring from the bare ground, giving it a beautiful milk-white colour. On the Pilatus 350 flowers have been counted within a square yard.

Orchidáceae. Orchid Order

Perennial herbs with underground rhizomes, or tubers usually occurring in pairs. Stems simple, unbranched. Leaves simple, with parallel or curving veins; but in a few chlorophyll-less species living on humus the leaves have degenerated into sheath-like scales. Flowers forming a spike or raceme, less frequently solitary and terminal, bisexual, with bilateral

symmetry, growing in the axils of bracts. The six divisions of the perianth are arranged in two circles of three. The posterior division of the inner circle, the lip (*labellum*), is usually bigger than the others, differing from them and very variable in shape, and is frequently provided with a spur or a sac-like appendage. By subsequent rotation of the ovary the flowers in many species are so arranged that the back half comes to the front (*resupination*). Stamens 1 or 2, united with the style to form a pillar. Ovary inferior, one-celled. Fruit usually a capsule bursting open with 6 valves; seeds very numerous, and extremely small, like dust.

In spite of their beauty, the orchids are to be regarded as a sure indication of poor soil and from the point of view of alpine husbandry must be considered as weeds.

Fig. 4. **Órchis globósus** L., *Kugelblütiges Knabenkraut.*

6–20 in. high. Tubers oblong, undivided, with short adventitious roots. Stem erect, straight or somewhat zigzag, with two or three short pointed sheathing leaves at the foot. Leaves but few in number, with long sheaths, not spotted, bluish-green on the under side; the uppermost leaf scale-shaped, pointed. Flower spikes at first forming a short pyramid, later globular, finally forming a short cylinder, with numerous small, almost scentless flowers, of a pale purplish-red or pink colour, very rarely pure white. Lip spotted in a darker shade. Bracts as long as, or longer than, the ovary. Divisions of the perianth distinct, at first inclining towards each other so as to form a helmet, later spreading like a bell. Spur slender, about a third or half as long as the ovary. Flowers from the end of May to August. Fertilized by butterflies.

Damp meadows, particularly on calcareous subsoils, from about 3300 to 6550 ft., sometimes descending the valleys.

Pyrenees, Central France, Alps, Vosges, Black Forest, Jura, Schwäbische Alb, Riesengebirge, Erzgebirge, Gesenke, Böhmisches Mittelgebirge, Apennines, Carpathians, Caucasus, Balkans.

Fig. 5. **Chamaeórchis alpínus** Rich., *Zwerg-Knabenkraut.*

2·5–5 in. high. Tubers undivided, oblong-eggshaped, of at most the size of a cherry. Stem has a few short sheaths at the base, and above them a few narrow, linear, grass-like, channelled leaves. Flowers small, greenish-yellow, in loose spikes of 5–10 flowers. Bracts linear, pointed, longer than the flowers. Lip slightly 3-lobed, with a large lobe in the middle and no spur. Flowers in June and July.

Poor meadows and stony places in the higher alps from about 6250 to 8850 ft. Found on calcareous subsoils.

Alps, Carpathians, Siebenbürgen, Northern Balkans, Norway, Northern Sweden, Lapland.

Fig. 6. **Coeloglóssum víride** Hartm., *Grüne Hohlzunge*, Green Habenaria, Frog Orchis.*

2·5–10 in. high. Tubers slightly flattened, oblong, usually 2-cleft. Leaves egg-shaped to lanceolate. Flowers yellowish-green, with brownish streaks, in rather loose oblong spikes. Divisions of the perianth egg-shaped, blunt, inclining towards each other, forming a helmet. Lip with three teeth in front, with a very short tooth-shaped spur; the middle tooth of the lip very short. Bracts lanceolate, pointed, longer than the flowers. Flowers in June and July.

Very widely distributed in damp pastures, in clearings in woods, and amongst mountain pine, from the foot of the mountains up to the alps, up to about 7850 ft. Widely distributed in Europe and North America.

The closely related Small Habenaria* (*Gymnadénia álbida* Rich., *Weisse Nacktdrüse*) has small whitish flowers growing in cylindrical spikes.

Fig. 7*a*. **Nigritélla nígra** Rchb., *Schwarzes Kohlröschen.*

Brändeli, Schokolade- or Chammblüemli, Kuhbrändli, Männertreu, Bergchölbli, Ruasseli, Möhrli, Mohrechöpfli, Schabenägeli, Walserli, Naseblüeter (Switzerland), Brunellen, Braunellen, Schweissblüml, Blutkraut, Blutrösl, Kohlrösl, Kölbel, Bränzchen (Tirol), Bräntele (Algäuer Alps), Schweissblümeln (Upper Bavaria), Jochbrändli, Blutströpfel, Schwarzling (Lower Austria), Blutnagel, Almvanille (Carinthia), Steinrösel (Upper Austria, Carinthia), Flurs d'alp, Fluor da tschigolatta, Flurs d'cuolm, Brünettas (Romansch-speaking Grisons), Sangon (Val di Gardena).

3–6 in. high. Tubers cleft like a hand. Leaves linear, blunt. Flower-spikes dense, globular to egg-shaped. Divisions of the perianth blackish-purple, less frequently reddish-pink (see fig. 7*b*), very occasionally yellow or white and red, with a strong scent of vanilla. Outer divisions of the perianth lanceolate, ·2–·3 in. long and about ·1 in. broad, the inner lateral ones being narrow and lanceolate. Lip three-cornered, with a long straight point, tapering towards the bottom, turning upwards. Spur very short, say a third as long as the ovary, which is not twisted round. Flowers from June to September.

Very common on dry sunny meadows on poor soil, grass patches and accumulations of humus in the alps and lower alps, from about 5580 to 9100 ft., occasionally descending lower.

Pyrenees, Auvergne, Jura, Alps, Apennines, Carpathians, Balkans, Scandinavia.

A closely related species, *Nigritélla rúbra* Wettst., which occurs chiefly in the Eastern Alps (occasionally also in Vorarlberg and Grisons), is taller and has a more elongated pyramidal spike. The inner lateral divisions of the perianth are as broad as the outer ones. The lip is egg-shaped, with a gradually tapering point, and is rolled up like a grocers' bag.

Besides these, a pink hybrid between *Gymnadénia odoratíssima* Rich. (*Wohlriechende Nacktdrüse*) and *Nigritella nigra* (*Schwarzes Kohlröschen*) is not uncommon.


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Fairly common in damp grass, " snowy valleys ", and watercourses, on rocky debris and on stony slopes of the alps and high alps, from about 5600 to 11,000 ft.

Pyrenees, Auvergne, Alps, Apennines, Riesengebirge, Gesenke, Carpathians, Scotland, Iceland, Urals, eastern and western Arctic regions, Northern Siberia, Rocky Mountains.

This species often covers great stretches of the rich black earth of " snowy valleys " (*Schneetälchen*) where the snow lies late and the ground becomes saturated with melting snow. Prefers non-calcareous soil.

Fig. 4. **Sálix reticuláta** L., *Netzaderige Zwergweide*, Reticulate Willow.*

Schneehünlweide (Pinzgau).

A small dwarf shrub with a branching stem lying along the ground and rooting everywhere. Leaves fairly large, long-stalked, elliptic or rounded, with recurved margins, under side (especially when young) silky with hairs (as a rule getting bare when old), with a distinct network of reddish veins, bluish-green, upper side dark green. Stipules wanting. Catkins on fairly long stalks, terminal. Catkin scales one-coloured, red. Flowers with a lobed nectary; male flowers with two stamens. Anthers of male catkins deep red before flowering. Capsules egg-shaped, densely covered with down. Flowers in July and August.

Common in damp places rich in humus, among boulders and on heaths in the alps and high alps, especially on limestone, from 5600–8200 ft., occasionally even higher, rising to 10,450 ft. (Monte Rosa).

Pyrenees, Alps, Jura, Carpathians, Scotland, Iceland, Urals, Altai Mountains, eastern and western Arctic regions, Rocky Mountains. Like the Dwarf Willow * (*S. herbácea*), this species has been found fossilized in many places; both flourished during the glacial period.

See also *Salix glauca*, Plate 34, fig. 4.

Betuláceae. Birch Order

This family is only very sparingly represented in the Alps. Apart from the Green Alder, only *Bétula pubéscens* Ehrh. (*Weichhaarige Birke*) ascends locally to alpine regions, occasionally to about 7200 ft.

Fig. 5. **Álnus víridis** DC. (= *Alnobétula víridis* Salisb.), *Alpen-* or *Grün-Erle*, *Birken-Erle*, *Berg-Latsche*, Green Alder.

Tros, Trosen, Drusen, Drossla, Erlätrooss (Switzerland, Algäuer Alps), Luttastaudn, Ludern, Luttern (Tirol, Carinthia), Drosa, Draussa, Drosole, Dralz, Malanza, Maros, Agn, Ougn (Romansch-speaking Grisons).

A brilliant green, many-branched shrub 2–5 ft. high. Leaves sticky when young, egg-shaped, elliptic, pointed or shortly tapering, doubly and abruptly serrate, green above and below, bare above, the veins below being covered with short hairs. Flowers unisexual, monoecious, i.e. male and female catkins occur on the same bush. Female catkins enclosed in buds during the winter, appearing in the spring at the same time as the leaves, later forming woody cones which persist for a long time. As in the case of the Birch, the seeds have well-developed transparent membranous wings. Cones green at first, very sticky, later brown. Flowers in May and June.

Very common on damp shady slopes, in watercourses, on heaps of debris, and among the mountain pine of the alps and lower alps, flourishing on damp northern slopes and preferring clayey or sandy subsoil. The bushes often form great expanses and give rise to a fertile soil. They are in great demand for firewood and play an important part as a weed in pastures and a protection on slopes. On steep northern slopes they not infrequently prevent landslides taking place.

Alps (beteeen 4900 and 7950 ft.), occasionally on the Swiss and Swabian-Bavarian plateaux, in the Black Forest, Böhmerwald, Böhmische Mittelgebirge, in the Elbsandstein and Lausitz regions, Carpathians, Balkans, Corsica, northern and sub-arctic Asia, Greenland, northern and Arctic America.


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Santaláceae. Sandalwood Order

Usually (and with us exclusively) green-leaved semi-parasites which by the help of peculiar suckers on their roots live on the roots of other plants. Leaves entire, without stipules. Flowers bisexual, regular, in racemes or panicles. Perianth single (i.e. not divided into calyx and corolla), cup-shaped, greenish, with the segments united. Stamens inserted into the tube of the flower. Ovary one-celled, inferior. Fruit usually nut-like.

Fig. 1. **Thésium alpínum** L., *Gebirgs-Leinblatt*, *Bergflachs*.

Frauenhaar (Tirol), Vermeinkraut (Tirol and Bavaria), Johanniskräutl (Lower Austria).

4–12 in. high. Stem prostrate, usually branching. Leaves narrow, linear, one-veined, yellowish at the fruiting stage. Inflorescence panicled, one-sided, with three bracts (one bract and two bracteoles) under each flower. Perianth usually with 4 lobes; margins of perianth forming a tube after flowering, curling inwards at the tips. Fruit globular. Fruit-stalk erect. Flowers in June and July.

Common on grassy slopes and on pastures of short grass; from the foot of the mountains up to the high alps, rising to about 9850 ft., occasionally found even in the plains.

Widely distributed in Southern and Central Europe (occasionally found even in Sweden), Caucasus.

Polygonáceae. Persicaria Order

Mostly herbaceous plants with tapering cylindrical stems, often jointed. Leaves alternate, usually entire, provided at the base with a membranous tube-shaped stipular sheath (*ochrea*), which surrounds the stem and axillary bud. Flowers small, regular, with a single perianth. Stamens 3–9. Ovary superior, one-celled. Fruit nut-like, one-seeded, often with 3 sharp edges, sometimes falling off with the perianth.

Fig. 2. **Rúmex scutátus** L., *Schildblätteriger Sauerampfer*, *Römischer Spinat*.

4–20 in. high. Root woody, penetrating deeply into the ground and usually sending up several stems. Leaves covered with a bluish bloom, spear-shaped; radical leaves broadly egg-shaped or fiddle-shaped; all the leaves definitely stalked. Stem prostrate or ascending, usually somewhat zigzag, tinged with red when growing in dry sunny situations. Flower-stalk slender, jointed below the middle. Flowers drooping, forming an apparent raceme. Perianth 5-cleft. Stamens 6–8. Fruit a sharp-edged, shining nut. Flowers from May to July.

Fairly common on rocks, screes, stony slopes, and river debris in the alps and high alps, rising to 8850 ft.; sometimes found at lower levels.

Fairly widely distributed in Southern and Central Europe, and in the East; in Germany outside the Alps it is found in Baden, Württemberg, and Bavaria, as well as in the neighbourhood of the Rhine and the valleys of its tributaries.

This species is sometimes cultivated as a vegetable under the names of " Römischer " or " Französischer Salat " or " Spinat ".

Fig. 3. **Rúmex alpínus** L., *Alpen-Sauerampfer*.

Blackte, Bletsche, Süblacketä, Ankäblackä, Grummetblacke, Staffelblacke, Süblacke, Rhabarberworzel (Switzerland), Schmalz-

or Butterplätschen, Hampletschen, Fabesplätschen (Tirol), Barbarawurzen (Lower Austria), Alm-Rhabarber, Wilder Rhabarber (Algäuer Alps, Carinthia), Pletschen, Fussplätschen (Bavaria), Sauplotsch'n, Scheissplotsch'n, Hauspletschen (Carinthia), Lavazza, Platese (Romansch-speaking Grisons), Lavac (Val di Gardena).

A strong erect plant growing as much as 6½ ft. high. Radical leaves very large (up to 20 in. long and 8 in. wide), rounded or heart-shaped, long-stalked, blunt, somewhat wavy at the edges; stem-leaves lanceolate; all have a large whitish sheath. Flower-stem channelled above. Panicle much branched, with close whorls of flowers. Flowers greenish. Flowers from June to August.

Very widely distributed and often gregarious on rich pastures in the alps, especially in the neighbourhood of herdsmen's huts and sheds on cattle pastures, from about 4900 to 8200 ft. On limestone and primitive rocks.

Pyrenees, Central France, Alps, Vosges, Black Forest, Riesengebirge, Adler- and Erzgebirge, Gesenke, Apennines, Carpathians, Balkans, Caucasus. In addition it is sometimes found as an escape from mountain villages where it is cultivated. In various parts of Switzerland and Montafon the whole plant is cooked and used to feed pigs. In Upper Bavaria the large broad leaves are laid on sore inflamed parts of the skin without any further preparation. They have a very cooling effect, and in the height of summer are also used to keep unsalted butter fresh.

Fig. 4. **Polýgonum vivíparum** L., *Knöllchen-Knöterich*, Viviparous Bistort.*

Aderzünglan, Otterzünglan (Carinthia), Bring ma's wida (Lower Austria).

6–10 in. high. Rootstock thickly covered with short leafy scales. Stem erect. Lower leaves long-stalked, lanceolate, tapering at both ends, greyish-green beneath, with recurved margins; veins thickened at the edge of the leaf. Inflorescence terminal, forming an apparent spike. Flowers white, tinged with red. In its lower part the spike bears small dark brown bulbs (" bulbils ") which fall off and grow into new plants. In the Alps these bulbils are a favourite food of the ptarmigan. Flowers from May to August.

Very common in meadows, pastures, and " snowy valleys " in the alps and lower alps, from 4900 to about 9850 ft., not infrequently descending lower, to about 1600 ft. Found on any kind of subsoil.

Pyrenees, Alps, Mt. Dore, Jura, Schwäbische Alb, Apennines, Carpathians, Siebenbürgen, Balkans, Caucasus, Altai Mountains, Himalayas, Northern England, Scotland, Northern Europe, Arctic regions.

See also *Polygonum Bistorta*, Plate 34, fig. 5.

Fig. 5. **Oxýria dígyna** Hill, *Alpen-Säuerling*, Mountain Sorrel.*

Arschügler, Vangias, Truspin, Spignatsch (Romansch-speaking Grisons).

2–6 in. high, with a habit like that of *Rumex scutatus*. Rootstock sending up many shoots. Stem leafless or with one or two leaves. Leaves long-stalked, kidney-shaped, notched at the extremity, almost all springing from the root. Flowers in whorls in loose terminal panicles, bisexual, drooping. Perianth of 4 segments, the two inner segments being larger, lying against the fruit, the outer ones smaller and reflexed. Stamens usually 4. Styles and stigmas 2. Fruit lens-shaped, with two wings, ·12–·16 in. long; wings at first pale green or light red, later blood-red. Flowers in June and July.

Occasionally found on damp gravelly debris, rocks and stony pastures in the high alps, from about 5600 to 11,150 ft. Found on primitive rocks and schists.

Pyrenees, Alps, Corsica, Carpathians, Balkans, Caucasus, northern and Arctic regions.


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Caryophylláceae. Pink Order

Herbs or subshrubs, with simple entire leaves, usually narrow and opposite. Stem forked towards the top. Flowers with their parts in fives, regular, usually bisexual, less frequently unisexual. Sepals distinct or united. Petals 4, 5, or completely absent, sometimes provided with a corona, very often forming a broad limb with a narrow claw. Ovary superior, more or less completely one-celled. Fruit a capsule usually containing many seeds, a one-seeded achene, or a berry.

Fig. 1. **Saponária ocymoídes** L., *Rotes Seifenkraut.*

4–14 in. high, forming a carpet. Stem extensively branched, prostrate. Leaves inversely egg-shaped, narrowing into the short leaf-stalk. Inflorescence forming a corymbose panicle, sticky. Sepals cylindrical, red, with sticky glands. Petals a vivid reddish-pink, rarely white, blunt or slightly notched, contracting suddenly into the narrow claw; corona with two teeth. Capsule membranous, 4-toothed. Seeds kidney-shaped. Flowers from May to October.

Common on sandy or rocky slopes exposed to the sun, amongst mountain pine, and on screes and landslides in alpine valleys, to about 4200 ft.; especially frequent on limestone. Great expanses of dry slope are often clothed with the brilliant flowers, which are visible a long way off.

This and various closely-related species are natives of Southern Europe. This pretty plant is very rare in Bavaria (found about Mittenwald, Garmisch), and is not found in Styria, Upper Austria, Lower Austria, or Salzburg.

Fig. 2. **Saponária lútea** L., *Gelbe Seifenblume.*

2–4 in. high, forming a carpet, much lower and much more compact than the previous species. Stem erect, thickly covered with leaves at the base. Leaves linear; radical leaves bare, upper leaves short-haired. Flowers in a dense, almost head-like corymb. Calyx rough-haired, with 5 small tapering teeth. Petals oblong, blunt, sulphur-yellow, somewhat purplish at the base, with a short corona. Styles 2, thread-like. Flowers in July and August.

Occasionally found on pastures of the high alps, where the grass is short, but only in the Southern or Western Alps: Dauphiny, Savoy, Piedmont, Lombardy, Ticino (Val de Riccia and Val Bavona); not found in Tirol or in the Pennine Alps (though it is found on the higher southern slopes of the Matterhorn and Monte Rosa).

Fig. 3. **Viscária** (= *Lýchnis*) **alpína** Don, *Alpen-Lichtnelke*, Red Alpine Campion.*

A small plant 2–6 in. high, with a rosette of radical leaves, forming a small carpet. Stem erect, bare, with a dense terminal inflorescence. Leaves lanceolate, sessile, bare, somewhat fringed at the base. Calyx bare, bell-shaped. Petals 2-cleft, of a beautiful pink colour, with a corona. Styles usually 5. Seed very small, kidney-shaped, papillose. Flowers in July and August.

Not very common; found on pastures and among boulders in the high alps, from about 6250 to 10,150 ft., especially on primitive rocks. Pyrenees, Alps, Northern England, Scotland, eastern and western Arctic regions, Altai Mountains. Not found in the limestone Alps of Bavaria; in Austria it is occasionally found in Tirol, Carinthia, and Salzburg.

Fig. 4. **Siléne rupéstris** L., *Felsen-Leimkraut.*

A bare little plant 4–10 in. high. Stem usually repeatedly forked, ascending. Leaves bluish-green, oblong-eggshaped, pointed; lower

leaves narrowing towards the base. Inflorescence forked, terminal. Flowers on fairly long stalks. Calyx circular, with blunt egg-shaped teeth. Petals notched, almost twice as long as the calyx, white or reddish-pink. Capsule remaining enclosed in the calyx. Seed kidney-shaped. Flowers in July and August.

On dry stony slopes, in thin pastures and light, arid woodlands, and on landslides in the alps, from about 5250 to 9200 ft., occasionally descending even lower, to 2625 ft. Most frequent on primitive rocks. Not found in Lower or Upper Austria; rare in Bavaria.

Pyrenees, Alps, Cevennes, Auvergne, Corsica, Black Forest, Vosges, Carpathians, Siebenbürgen, Southern Scandinavia, Altai Mountains.

Fig. 5. **Heliospérma** (= *Siléne*) **quadrífidum** Rchb., *Vierzähniger Strahlensame.*

2–8 in. high, usually forming a loose carpet, with numerous forked stems. Upper branches of stem and flower-stalks sticky, as thin as hairs. Leaves very narrow, but the lower ones are somewhat broader and slightly hairy at the bottom. Calyx bare, shaped like a top, with ten inconspicuous veins and blunt egg-shaped teeth. Petals narrow, white, rarely reddish-pink, with four teeth and a short corona. Capsule egg-shaped, as long as, or somewhat longer than, the calyx. Seed much compressed, with a comb-like arrangement of hairs. Flowers from June to September.

Very common on or under damp cliffs and beside streams and springs in the alps, from about 4450 to 8200 ft., descending to about 1650 ft. in the Southern Alps. Found on limestone.

Pyrenees, Jura, Alps, Corsica, Carpathians, Balkans.

A closely related species, *Heliospérma alpéstre* Rchb., with broader, thicker leaves and larger white flowers, is found in Tirol, Lower Austria, and Carniola.

Fig. 6. **Gypsóphila répens** L., *Kriechendes Gipskraut.*

3–10 in. high, covered with a bluish bloom. Stem creeping or ascending, often forming a carpet, bare like its branches, with leaves at wide intervals. Leaves somewhat fleshy, linear, pointed, bluish-green, tapering to both ends, usually bent somewhat like a sickle. Calyx shaped like a top or bell, divided into 5 half-way down. Petals white or bright red, crenate or notched, gradually narrowing into the tube. Seeds black, kidney-shaped, papillose. Flowers from May to August.

On stony and rocky meadows, river gravels, debris, and in *Ericaceae* thickets in the alps and lower alps, very common up to about 5900 ft., occasionally found up to 8850 ft.; also carried down far into the plains by alpine rivers (e.g. to below Basel by the Rhine). A limestone-loving plant.

Pyrenees, Alps, Jura, occasionally in the Harz (Sachsenstein near Walkenried) and in Hesse (Vogelsberg between Elpenrode and Ruppertenrod), Carpathians, Apennines, and occasionally in Poland.

Fig. 7. **Siléne acaúlis** L., *Stengelloses Leimkraut*, Moss Campion.*

Deuflspeitsch'n, Teufelspeitschn, Moosbleaml (Lower Austria, Styria), Miesveigl, Miesnagl (Salzburg), Steinkraut (Bernese Oberland), Alpapolster (St. Gallen), Zigeunerkraut (Eastern Tirol, Carinthia), Polsternagerln (Upper Austria), Gemswasen (Valais).

This plant forms dense, flat, turfy cushions. Leaves linear. Flowers solitary, terminal, on short stalks, projecting only a short distance from the cushion. Calyx oblong-cylindrical, 10-veined, half as long as the fruit capsule, obliquely truncated at the bottom. Petals inversely egg-shaped, slightly notched, of a vivid red colour, rarely white. Some cushions are bisexual, others unisexual. The sub-species *excapa* (All.) Koch is distinguished by closer, globular cushions and smaller, paler flowers. The calyx narrows into the flower-stalk and the oval fruit-capsule is only slightly, or not at all, longer than the calyx. Flowers from June to August.

Forms dense cushions, often the size of one's foot, thickly covered with beautiful flowers; found on pastures, mountain ridges, and screes in the alps and high alps, from about 5600 to 11,800 ft. Prefers limestone.

Pyrenees, Alps, Carpathians, North-western Balkans, Urals, eastern and western Arctic regions (Rocky Mountains).


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with 10 teeth, a little swollen at the bottom; teeth not rolled back. Flowers in July and August.

Fairly common among boulders, on stony places and in clefts of rocks in the alps and high alps, from 5600 to 11,150 ft. Only on limestone.

Alps, Carpathians, Caucasus, Scandinavia.

Various other species besides this one are found in alpine regions, but they are not very easily distinguished from one another.

Fig. 5. **Alsíne** (= *Minuártia*) **vérna** Wahlenberg, *Frühlings-Miere*, Vernal Sandwort.*

2–6 in. high, forming a small carpet. Non-flowering shoots compact and densely leaved; flowering shoots erect, with leaves at wider intervals. Stem bare, usually with several flowers. Leaves needle-like, usually straight, 3-veined. Sepals eggshaped-lanceolate, 3-veined; veins sharply marked off. Flower-stalks, together with the calyx, covered with glandular hairs. Petals egg-shaped, longer than the calyx, 3-veined. Stamens 10. Styles 3. Flowers from May to August.

Common in dry meadows and pastures and on rocky places in the alps and lower alps, from about 4900 to 10,500 ft., occasionally also on the lower ground.

Pyrenees, Alps, Auvergne, Cevennes, Apennines, Upper Swabia (Wolfegg), Fränkischer Jura, Harz, Thuringia, &c., Riesengebirge, Bohemia, Carpathians, Balkans, Caucasus, northern and Arctic regions.

This genus also is represented in the Alps by numerous other species which are usually difficult to distinguish from each other.

Fig. 6. **Arenária ciliáta** L., *Wimper-Sandkraut*, Fringed Sandwort.*

1–4 in. high. Stem creeping, extensively branched, prostrate or somewhat ascending, with numerous non-flowering shoots. Leaves eggshaped-lanceolate, with bristly hairs at the foot. Flowers terminal, solitary or in small groups. Petals white, entire. Capsule bursting open with 6 short valves. Flowers in July and August.

Occasionally found on stony slopes in the alps and high alps, from about 4900 to 10,150 ft., and on river-gravels in alpine valleys. Flourishes on primitive rocks.

Pyrenees, Alps, Carpathians, northern and Arctic regions.

Fig. 7. **Cherléria** (= *Alsíne*) **sedoides** L., *Fettkrautmiere*, Cyphel.*

A small plant, forming dense moss-like cushions. Leaves sturdy, lanceolate, channelled, blunt, somewhat spreading, here and there somewhat fringed with hairs. Flowers solitary, terminal, short-stalked. Flowers with their parts in fives. Sepals 5, pale green. Petals often wanting or, if present, small and bristle-shaped. Stamens 10; the outer ones lowermost, with two small glands. Styles 3. Flowers in July and August.

Occasionally found among boulders, on screes, and in clefts of rocks of the alps and high alps from about 5900 to 12,450 ft.

Mountains of Scotland, Pyrenees, Alps, Corbières, Carpathians.

Fig. 8. **Diánthus alpínus** L., *Alpen-Nelke*.

Kuhdrecknagerl (Lower and Upper Austria), Almanagerl (Styria).

A plant 8–8 in. high, with a few rosettes of radical leaves and several erect stems bearing one or two flowers and 2–3 pairs of leaves. Leaves lanceolate, blunt, one-veined, narrowing towards the base. Bracts lanceolate, with herbaceous points. Petals of a beautiful pink colour on the upper side, deep purplish-red, speckled with white, in the tube. Flowers from June to August.

Fairly common on grassy and rocky slopes in the alps and lower alps of the eastern chain of the Alps, as far west as the Salzach and Tirol. Not found in Switzerland or Bavaria.

Diánthus glacidlis Hänke (*Gletscher-Nelke*), a lover of primitive rocks, is a closely related species. This plant, however, is considerably lower and more compactly built, and has narrower leaves and non-variegated flesh-pink petals.

Fig. 9. **Diánthus silvéster** Wulfen, *Stein-Nelke*.

Fluehnägeli, Steinägeli, Wildes Nägeli, Berg-Nägel (Switzerland), Steinnagele, Stoannagerl (Tirol), Almnagerl (Carinthia), Flur da meil, Groffel, Garoful (Engadine).

A bare plant 2–12 in. high. Rootstock sending up several compact bunches of leaves. Stem erect, with leaves at wide intervals and 1–3 flowers. Leaves narrow and linear, pointed, somewhat rough at the edge, grass-green or bluish-green. Bracts small, shorter than the semi-herbaceous calyx-tube, blunt, with short, almost triangular points. Petals reddish-pink, somewhat fringed at the edges, but with no fringe inside the tube. Flowers from June to August.

Not uncommon on stony meadows and dry slopes and in clefts of rock in the alps and high alps, up to about 9200 ft. Not found in Upper or Lower Austria.

Pyrenees, Alps (in Bavaria found as a rare plant in the Algäuer Alps), Carpathians, Siebenburgen, Southern Europe, North-western Balkans. On limestone and primitive rocks.


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Ranunculáceae. Buttercup Order

Mostly perennial herbs or shrubs, with large flowers, which are usually adapted for pollination by insects. The genus *Thalictrum*, however, in which the flowers are small and numerous and have easily movable anthers, is partly wind-fertilized. Leaves usually alternate, less frequently opposite (e.g. *Clematis*). Stipules wanting. Flowers usually regular, less frequently with bilateral symmetry, as in the Larkspur and Monkshood. Calyx and corolla not always distinguishable. Perianth often simple, or petal-like nectaries are inserted between the perianth (which is divided into numerous segments) and the stamens. Stamens and ovaries usually numerous. Fruit a one-seeded achene, a many-seeded follicle, or occasionally a capsule or berry. The numerous representatives of the two genera *Anemóne* and *Ranúnculus* (and in the east *Calliánthemum* also) are among the most distinctive and beautiful of alpine plants (see also Plate 31).

Fig. 1. **Delphínium elátum** L., *Hoher Rittersporn.*

A subshrub 2–5 ft. high. Leaves on long stalks, palmate, with 5–7 3-cleft, coarsely and finely toothed lobes. Stem erect, leafy all the way up. Racemes rather close, as much as a foot long. Flowers with bilateral symmetry, as in the Monkshood. Perianth (calyx) of 5 sepals, of a brilliant azure blue, readily falling off; the upper or back sepal is prolonged to form a projecting spur. The four small nectaries are brownish-black. Follicles beaked. Flowers in June and July.

Occasionally found in meadows, beside streams, at the bottom of corries, and in open woods in the lower alps and alps, from about 4200 to 6550 ft. Not found in Bavaria, Upper Austria, Lower Austria, or Carniola.

Pyrenees, Alps, Carpathians, Riesengebirge, Silesia, Moravia and Bohemia, Caucasus, Northern Europe, Siberia, Central Asia. Also grown as an ornamental plant in gardens.

Fig. 2. **Clématis** (= *Atragéne*) **alpína** Mill., *Alpen-Rebe.*

Goas-straub'n (Salzburg, Tirol), Schlingpflanz'n (Lower Austria), Ziachglocken (Carinthia), Blauhopfen (Styria).

A graceful climbing plant or creeper (the only one found in the Alps), 3–6½ ft. high, which climbs by means of its twining flower-stems, or hangs down from rocks. Leaves opposite, long-stalked, twice ternate. Flowers solitary, axillary, on long stalks, hanging straight down or at an angle. Petals 4 or 5, inclining towards each other to form a bell, large, rich violet to pale blue, very occasionally white. Nectaries numerous (10–12), half as long as the petals, oblong-spatula-shaped, yellowish-white. Stamens numerous, yellow. Fruit like a wig, with lengthened styles covered with feathery hairs (a flying mechanism). Flowers from May to July.

Locally in thickets and woods, and also on rocks in the alps and lower alps, from 3300 to 7200 ft.; in shady valleys occasionally descending a long way, to 975 ft. (e.g. at the Eibsee, in the Partnachklamm, in the Isartal above Munich, near Brannenburg, at the Königssee in Upper Bavaria, near Blumau and in meadows near Bolzano at 975 ft., near Lunz in Lower Austria).

Pyrenees, Alps, Apennines, Carpathians, Northern Russia, Northern Asia, North America. Flourishes on limestone.

Fig. 3. **Thalictrum alpinum** L., *Alpen-Wiesenraute*, Alpine Meadow Rue.*

An inconspicuous little plant 2–5 in. high, locally very abundant in alpine meadows. Leaves forming a rosette on the ground, long-stalked, twice pinnate. Leaflets inversely egg-shaped, coarsely crenate. Stem simple, leafless or with one leaf, terminating in a simple loose raceme of only a few flowers. Flowers small and dainty, drooping. Perianth (calyx) of 4 sepals, inconspicuous, soon falling off. Stamens numerous, up to 15 in number. Seeds small, stalked, longitudinally furrowed, with bent red stigmas. Flowers in July and August.

Locally abundant in stony alpine meadows, from 6250 to 9200 ft.

Pyrenees, Western and Eastern Alps (in Switzerland only in the Engadine, Münstertal and Poschiavo), Caucasus, northern and Arctic regions.

Fig. 4. **Aconitum Napéllus** L., *Blauer* or *Echter Eisenhut*, Common Monkshood.*

Giftchrut, Isenhüetli, Bloze, Böhne, Bohnenchrut, Schwin-Bohnen, Fuchswürze, Lubritschen, Kapuzinerchäppli, Tübli, &c. (Switzerland), blaue Gelstern, blaue Wolfswurz, Eisenhütl (Tirol), Teufelwurz (Lienz), Tauberl im Nest, Fuchswurzn, Fuchsblüah (Austria), Rössl, Tauberl im Schlag (Upper Bavaria), Teufelswurz, Venuswagen, Giftkraut, Hundstod, Krähstelze (Styria), blaue or schwarze Wolfswurz (Carinthia), Apolloniawurzen (Salzburg, Styria, about Berchtesgaden, Pinzgau), Ziegentod, Arche Noah's, Blaukappenblumen (Silesia), Eliaswagen, Hambörger Mützen (East Friesland, Mecklenburg), Blaue Pantoffeln, Kutschen, Ziegenwürglich (Riesengebirge), der lieben Frau Lederschuh, Kalessen (Böhmerwald), Strafasuri, Malam, Felesch, Tus-cin, Columb, Culüm (Romansch-speaking Grisons), &c.

A handsome plant 2–5 ft. high. Root blackish, fleshy, thickened like a turnip. Stem strong, erect, usually straight and unbranched; like the erect flower-stalks, it is bare or has only a few long hairs. Leaves stalked, palmate, completely divided into 5–7 lobes, with long narrow segments; usually dark green above, light green and shining below. Racemes fairly dense, usually unbranched. Perianth (calyx) bluish-violet, occasionally reddish or white, petaloid, divided into five. The upper or back segment, the " helmet ", encloses the two long-stalked nectaries, " doves in Venus' chariot ", like a cowl or hood. Stamens numerous, bare or fringed with hairs. Follicles 3, many-seeded, separating from each other soon after the flower withers. Seeds brown, with 3 sharp edges. Flowers from June to August.

Very common in thickets, on screes, in damp meadows rich in humus, and beside streams, from the foot of the mountains up to the alps (to 9850 ft.), where this plant often occurs in great quantities as a common, troublesome and poisonous weed on rich and well-manured ground, especially in the neighbourhood of herdsmen's huts.

Mountainous woods almost all over Europe, reaching northwards as far as Sweden.

As the rootstocks of this plant are well paid for by druggists, digging them up provides the alpine-dweller with a subsidiary source of income. From the point of view of alpine husbandry, the monkshood is to be regarded as a weed. Hence its growth is combated on all the better-managed alps, and attempts are made to get rid of it by rooting it out or repeatedly cutting it down before flowering-time. Being poisonous, it is always avoided by grazing cattle. The root is used as a remedy for toothache.

Two other blue-flowered species besides the Monkshood are found in mountainous woods, namely *Aconitum paniculátum* Lam. (*Rispen-Eisenhut*) and *A. variegátum* L. (*Bunter Eisenhut*).


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Ranunculáceae. Buttercup Order (*Continued*)

Fig. 1. **Anemóne** (= *Pulsatílla*) **alpína** L., *Alpen-Windröschen.*

Bergmännli, Haamanteli, Schudermann, Haarige or alti Mannen, Hexenbesen, Sidahuat, Bocksbart, Bäre-Plumpe, Tüfelsbart, Graumannli (Switzerland), Teufelsbart (Riesengebirge, Algäuer Alps), Peterbart (Upper Bavaria), Almrugei (about Berchtesgaden), Haselmunich, Räuchling, Schneeros'n, Bärentaz'n, Rugerl (Tirol), Schneehahnl, Grantiger Jäger (Upper Austria), Harrimarsch, Schneerose (Styria), Räuchling, Räucherlen, Wilder Jäger (Carinthia), Brockenblume (Harz), Pavun (Romansch-speaking Grisons). Most of these names refer to the wig-like fruiting head.

6–12 in. high. Radical leaves ternate, twice pinnate, with cut or deeply lobed segments, with projecting hairs at intervals. Flowers solitary, a considerable distance above the involucre; petals usually 6, flat and spreading, white with streaks of violet outside, or, as in the variety *sulphúrea* L. (fig. 2), sulphur-yellow. Bracts of involucre stalked, shaped very like the leaves. Fruits with long feathery-haired styles. Flowers from June to August.

Fairly common on pastures, stony slopes, screes, and amongst mountain pine, from about 4900 to 8950 ft. Prefers limestone, but is not confined to it. The yellow-flowered form avoids limestone and occurs on primitive rocks.

Pyrenees, Auvergne, Cevennes, Alps, Southern Swiss Jura, summits of the Vosges, Harz (Brocken), Riesengebirge, Isergebirge, Apennines, Carpathians, Siebenbürgen, Balkans, Caucasus, eastern Arctic regions, North America.

The two forms can be fairly easily distinguished by their cotyledons; those of *Anemone alpina* are fairly broad, short, and blunt, while those of the variety *sulphurea*, on the other hand, are narrow, thread-like, and pointed. When out of flower, however, the two forms are easily confused. In Bavaria it is the typical white form that occurs almost exclusively, the variety *sulphurea* being found only in the Algäuer Alps (Ochsenalpe in the Bärgündele). Both forms are *Pollenblumen* (i.e. pollen-bearing flowers with conspicuous petals but no honey). Conrad Gesner (1555) mentions the plant under the name of " Bitzwurz ", because it was used to poultice poisonous bites on cattle.

Fig. 3. **Anemóne** (= *Pulsatílla*) **montána** Hoppe, *Berg-Küchenschelle.*

Pfaffenblumen (Klausen in Tirol), Osterblume (Merano).

3–12 in. high. Radical leaves annual, dying down in the winter; they have not yet appeared, or are only just beginning to appear, at the normal time of flowering; at first silky with hairs, later becoming almost bare, twice pinnatifid, with linear segments ·05–·2 in. across. Leaf-stalks broadened at the foot to form a sheath. Scape bearing a solitary flower, and below it an involucre of numerous hairy bracts. Perianth dark violet, occasionally reddish-pink, pale blue, or whitish, densely covered with silky hairs outside, at first bell-shaped, later spreading like a star. Fruit with rough hairs and projecting hairy styles as much as 1·2 in. long. Flowers in March and April.

Fairly common on dry sunny slopes in the southern valleys of the Alps; from the foot of the mountains up to the alps (to about 7050 ft.).

Only found in Dauphiny, Auvergne, in Switzerland (Valais, Ticino, about Chur, in the Domleschg and Münstertal), in Southern Tirol, Carniola, Küstenland, Siebenbürgen, Balkans and Southern Russia.

Fig. 4. **Anemóne narcissiflóra** L., *Narzissenblütiges Windröschen.*

A handsome plant 4–20 in. high, covered with projecting hairs. Leaves long-stalked, springing from the root, palmate, 3–5-lobed, with narrow tapering points. Flowers 3–8 in an umbel, with an involucre of ternate leafy bracts at its base. Perianth usually of 5 parts, opening flat, blunt or rounded at the extremity, white, often with reddish streaks outside. Fruits few, rounded and laterally compressed, bare, slightly winged, with short beaks. Flowers from May to July.

Not very common; found in rich meadows and pastures and among mountain pine in the lower alps and alps, from about 4900 to 7200 ft., less frequently descending lower (to 2225 ft. near Andechs in Upper Bavaria, and to 1475 ft. near Kufstein in Northern Tirol). Especially frequent on calcareous soil.

Pyrenees, Alps, Vosges, Swiss Jura, Schwäbische Alb, Riesengebirge, Hochgesenke, Siebenbürgen, Balkans, Caucasus, mountains of Central Asia, North-eastern Asia to Sakhalin and Japan, Kamchatka, North America. In Southern Russia and Southern Siberia this plant and the following one are found on the steppes.

Fig. 5. **Anemóne** (= *Pulsatílla*) **vernális** L., *Frühlings-Windröschen.*

Bluetströpfli, Wolfsblueme, Isechrut, Schneeglogge, Trüeb-chrut (Switzerland), Eselsglocken (Tirol), Ganslan, Gänserle, Gugguhosen (Carinthia), Waldtulpe (Silesia), Wilder Krokus, Schlafblume (East Prussia), Anemono primaticcio (Ticino), Flur d'luf luffas (Romansch-speaking Grisons), Falwe Häschi (Valais).

A beautiful plant 2–6 in. high (as much as 14 in. when in fruit), sparsely haired. Leaves springing from the root, lasting through the winter, once pinnate, the leaflets having 2 or 3 irregular lobes with entire or 2–3-cleft tips. Lower leaves smaller and with shorter stalks than the upper ones. Flowers solitary, at first nodding and bell-like, later erect and open, white or pale violet, shining with silky hairs. Bracts sessile, palmate, much-divided, growing together at the foot to form a sheath, very close to the flower, with bronze-gold hairs. Fruiting heads erect on the greatly lengthened stalks. Fruit shaggy; when ripe the styles are greatly lengthened (to 1·6 in.), rough-haired and yellowish. Flowers immediately after the snow melts, from March to June, often in company with *Crocus vernus* (Plate 4, fig. 3), *Soldanella alpina* (Plate 21, fig. 10), and *Primula minima* (Plate 20, fig. 2) (but the latter only in the Eastern Alps).

Locally on pastures and grassy slopes in the alps, up to about 11,800 ft. Also found locally in Central and Southern Germany, and in Bohemia, on heathy pastures or in light sandy pinewoods.

Pyrenees, Alps, Carpathians, South-eastern and Central Europe, Scandinavia, Northern Russia and the adjoining parts of Siberia.

Among other Anemones, *Anemóne Baldénsis* L. (see Plate 31, fig. 1), with ternate, 3–5-lobed leaves, and *Anemóne trifólia* L., with ternate leaves, may be mentioned as occurring in the Southern and Eastern Alps


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Ranunculáceae. Buttercup Order (*Continued*)

Fig. 1. **Ranúnculus parnassifólius** L., *Herzblatt-Hahnenfuss.*

1·5–4 in. high, stem thickened below like a bulb, covered with scales. Radical leaves long-stalked, heart- to egg-shaped, entire, bluish-green, with woolly hairs on the upper side (especially on the main veins and along the margins). Stem erect, bearing numerous flowers, covered with white woolly hairs, like the flower-stalks. Sepals with reddish hairs, half as long as the petals and nectaries, which are white, sometimes with reddish streaks outside. Beaks of the fruit hooked. Flowers from June to August.

Occasionally found among limestone boulders and rocky debris of the high alps, from about 6250 to 9500 ft., but it is absent from certain localities, e.g. the Bavarian Alps, Upper and Lower Austria, and all Carniola.—Pyrenees, Alps.

Fig. 2. **Ranúnculus montánus** Willd., *Berg-Hahnenfuss.*

Tschäppelblüemli (Grisons: St. Antönien), Flur d'painch (Engadine).

3–6 (or even 20) in. high, very variable in size. The plant shown in the figure comes from a high alpine habitat (" snowy valley "). Radical leaves palmate, with 3-cleft, inversely egg-shaped, bluntly-toothed segments; the lower ones usually with 5 lobes, and hairy, like the whole plant. Stem erect, solid (not hollow as in the common Meadow Crowfoot * (*R. acer* L., *Scharfer Hahnenfuss*)), with one or two sessile, deeply cleft leaves, and as a rule 1–3 flowers, less frequently with more. Petals shining, deep yellow. Flower-stalks circular, tapering, not furrowed. Receptacle hairy. Seeds with distinct margins, bare, with short bent beaks. Flowers from May to September.

Very common in dampish meadows and pastures, in " snowy valleys ", on screes, on banks of streams, and at the edges of woods, from the foot of the mountains up to the alps, from about 3300 to 9700 ft.; sometimes descending on to the plateaux (in Bavaria as far north as the neighbourhood of Munich and Augsburg). Found on limestone and primitive rocks.

Pyrenees, Alps, Jura, Schwäbische Alb, Black Forest (Feldberg), Carpathians, Siebenbürgen, Balkans, Caucasus.

Fig. 3. **Ranúnculus glaciális** L., *Gletscher-Hahnenfuss.*

Gamskress, Ribiol, Tribiol (Tirol, Drave valley), Weisse Besengablüh (Salzburg), Creschun d'chamoutsch, Erba di camosch (Romansch-speaking Grisons).

1·6–6 in. high. Rootstock thickened like a bulb, with numerous fibrous roots. Radical leaves ternate, with stalked leaflets divided into three or more segments. Stalk bearing one or more flowers and on its upper part a few simple divided sessile leaves. Calyx hairy. Corolla large, basin-shaped, white, usually reddish-pink or dark red outside. Fruits flattened. The form *holosericeus* Gaudin, which occurs chiefly on granite, is distinguished by its calyx and leaves, which are covered with cobwebby hairs. Flowers in July and August.

On rocky debris and in clefts of rocks in the high alps, in the neighbourhood of eternal snow, from 6550 to 13,100 ft. Has been observed on the Matterhorn at 7875 ft., and on the Finsteraarhorn (Bernese Alps) even at 13,700 ft., being the highest-growing flowering plant in the Alps.

Pyrenees, Alps (in Bavaria only on the Linkerskopf and Wildengundkopf in the Algäuer Alps), Carpathians, Siebenbürgen, and in northern and Arctic regions. Found only on primitive rocks.

Fig. 4. **Ranúnculus Thóra** L., *Gift-Hahnenfuss.*

Hahnekamp, Hahnakampel (Lower Austria), Hahnkramperl (Styria).

2–12 in. high. Fibrous roots thickened like a bulb. Stem not much branched, bearing 1–5 flowers. Radical leaves soon withering. Lowest stem-leaf rounded-kidneyshaped, crenate, 3–4 in. long, entire. Corolla yellow. Fruits not numerous, almost globular, swollen, with a short bent beak. Flowers from May to July.

Occasionally found on rocky slopes in the high alps, ascending to 7200 ft.; most frequent on limestone.

Pyrenees, Jura, Alps, Carpathians, Balkans. Not found in Bavaria or Northern Tirol, very rare in Carniola.

Fig. 5. **Ranúnculus alpéstris** L., *Voralpen-Hahnenfuss.*

Alpenkresse, Jägerkraut (Lower Austria), Weisse Besengablüh (Salzburg), Arone, Marienchrut (Switzerland).

2–4 in. high, with one or two stems. Radical leaves on fairly long stalks, with a heart-shaped outline, deeply cut into 3–5 lobes, with deeply crenate or cleft tips. Stem erect, bare, furrowed, leafless or with one or two narrow, tongue-shaped, entire or 3-cleft leaflets, almost always with one flower only. Petals notched, brilliant white. Fruit almost globular, swollen, with a long beak bent like a hook at the tip. Flowers from May to September.

Very common in damp pastures, on slopes, and in " snowy valleys " in the alps and lower alps, from 4900 to 9050 ft., occasionally descending to 1650 ft.

Pyrenees, Alps, Jura, Carpathians. Flourishes on limestone.

Fig. 6. **Ranúnculus Pyrenæus** L., *Pyrenäen-Hahnenfuss.*

2–6 in. high; base of stem covered with fibrous remains of leaves. Leaves narrow, grass-like, lanceolate, bare, rather bluish-green, with entire margins. Stem bearing one or more flowers, and a few narrow stem-leaves ·08–·2 in. broad. Flower-stalk woolly at the end. Calyx bare. Corolla pure white. Seeds swollen, smooth, with short beaks. The variety *plantagíneus* All. has 3–7 flowers and broader stem-leaves (·2–·4 in.). Flowers in June and July.

Not very common; found in damp pastures and on sunny slopes rich in humus in the alps and higher alps, from 5750 to 9100 ft., especially on limestone.

Pyrenees, Alps. Not found in Bavaria, Upper and Lower Austria, Salzburg, or Carniola. —Other species are shown on Plate 31.

Papaveráceae. Poppy Order

Stiff-haired herbs, often with milky juice, having alternate leaves which are usually pinnately cut. Stipules absent. Sepals 2 (less frequently 3), as a rule falling off before the flower unfolds. Petals usually 4. Stamens numerous (at least 4). Fruit a superior capsule, usually with many cells and numerous seeds.

Fig. 7. **Papáver Pyrenáicum** A. Kerner (= *Papáver Sendtnéri* Kerner), *Weisser Alpen-Mohn.*

2–8 in. high. Stem covered with stiff yellow hairs, bearing one flower. Radical leaves simple, pinnatifid, with fairly broad tips which are often lobed, sparsely haired or bare. Flowers large, as many as 200 from a single rootstock. Calyx thickly covered with blackish hairs. Petals pure white, or greenish yellow to blackish towards the base. Stamens numerous. Capsule inversely egg-shaped with 4–8 dark rays (stigmas). Flowers in July and August.

Occasionally found on limestone debris in the higher alps, from about 6550 to 8850 ft. Northern limestone Alps, from Pilatus (Switzerland) to the Dachstein in Upper Austria.

Fig. 8. **Papáver Rǽticum** Leresche, *Bündner Alpen-Mohn.*

2–6 in. high. Stem covered with stiff hairs, bearing a solitary flower. Stem-leaves simply pinnatifid, with broadly lanceolate tips, sometimes with 2–3 lobes at the extremity, usually very hairy. Calyx thickly covered with dark brown hairs. Petals golden-yellow, reddish-yellow when dried. Capsule inversely egg-shaped, covered with stiff hairs, having 4–8 rays (stigmas). Flowers in July and August.

Rather uncommon; found among boulders in the alps, from about 5900 to 9700 ft., occasionally carried down by streams (to 4275 ft.). Fairly widely distributed in Austria (with the exception of Lower Austria, where it is not found at all); in Switzerland chiefly in the Grisons (Engadine).


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Crucíferae. Cruciferous Order

Herbs with alternate entire or divided leaves. Stipules wanting. Inflorescence almost always a raceme, compressed before flowering like an umbellate panicle. Bracts usually absent. Flowers usually have a regularly formed calyx consisting of two outer and two inner sepals, which soon fall off. Petals 4, arranged in a circle. Stamens 6, the two outer ones being shorter than the other four, which are arranged in pairs. Ovary superior, formed from two carpels, divided into two cells by a false partition. Fruit usually a 2-valved, many-seeded pod or a pouch with one or many seeds, more rarely a lomentum (i.e. a pod which when ripe separates transversely into one-seeded joints).

Many cruciferous plants are biennial. In the first year they develop a thick rosette of radical leaves, from the middle of which the flower-stalk rises in the following year.

Fig. 1. **Aëthionéma saxátile** R.Br., *Felsen-Steinkresse.*

A slender little plant 2–8 in. high, usually much branched from the ground upwards, less frequently remaining unbranched. Leaves oblong-linear, blunt, bluish-green, entire; lower leaves somewhat egg-shaped. Flowers small, reddish. Raceme lengthening when in fruit. The filaments of the four inner and longer stamens have toothed edges. Pouch laterally compressed, oval, with a broad wing with finely crenate edges and indented at the tip, sometimes bursting open, sometimes an achene. Flowers from April to June.

Found here and there on gravelly, stony slopes in the limestone alps, not uncommonly carried down to the plains with river gravel of alpine streams, e.g. by the Isar to Munich and Landshut, in Southern Tirol to Lake Garda, and in Lower Austria to Baden near Vienna.

Spain, Pyrenees, Central France, Sicily, Alps, Carpathians, Balkans, Asia Minor.

Fig. 2. **Biscutélla levigáta** L., *Brillenschötchen.*

8–12 in. high. Rootstock branched, throwing out flowering and non-flowering shoots, the former being the longer. Radical leaves oblong, wedge-shaped, tapering to the leaf-stalk, covered with stiff hairs, entire or somewhat toothed; upper leaves narrow and sessile. Petals bright yellow. Fruiting head forming a loose raceme. Pouch spectacle-shaped, much flattened, bare, or covered with small nodules and hence somewhat rough. Flowers from May to August, in low-lying situations till November or January.

Very common on rocks, on sunny stony places, and in dry pastures in the alps and lower alps (up to 9175 ft.), but very often found lower down. It is not a true alpine plant.

Widely distributed in Mediterranean regions, in the Alps, and in Central Europe.

Fig. 3. **Árabis púmila** Jacq., *Zwerg-Gänsekresse.*

A plant 2–10 in. high, with a rosette of radical leaves and only a few (2–3) sessile stem-leaves. Leaves entire or slightly toothed, oblong-eggshaped, rough with stellate hairs; radical leaves tapering into their short stalks. Corymbs with only a few flowers. Petals white. Pods 1–1·6 in. long, and ·07–·08 in. broad, tapering to both ends. Seed smooth, rounded, surrounded by a broad membranous wing. Flowers from June to August.

Fairly common on rocks and rocky debris in the alps and high alps, from about 4900 to 9400 ft., sometimes carried down into the plains by rivers (to 1975 ft.).

Alps, Apennines, Carpathians. A typical limestone plant.

Fig. 4. **Árabis alpína** L., *Alpen-Gänsekresse.*

A plant 2·5–16 in. high, with several upright or ascending flowering or non-flowering stems, branching towards the top and rough with stellate hairs, and a rosette of radical leaves. Leaves heart-shaped at the base, clasping the stem, with coarsely waved and serrate margins. Petals wedge-shaped, white. Pods on short stalks, somewhat spreading, 1–2·4 in. long, and ·06–·08 in. broad. Seed rounded and flattened, winged. Flowers from May to September.

Found nearly everywhere among boulders, on cliffs, and about springs in the alps and lower alps, up to 10,500 ft., not uncommonly carried down by rivers even to the plains (by the Rhine to St. Margrethen and to Rust near Breisach, by the Isonzo almost to the sea, and by the Salzach to Burghausen).

Pyrenees, Alps, Auvergne, Cevennes, Jura, Schwäbische Alb, occasionally in the Harz and in Sauerland (near Brilon), Riesengebirge, Carpathians, Arctic regions, Himalayas. On limestone and primitive rocks.

Fig. 5. **Thláspi rotundifólium** Gaud., *Rundblätteriges Täschelkraut, Gemskresse.*

2–6 in. high. Rootstock with many underground branches, like runners, ending in numerous flowering and barren shoots. Radical leaves forming a rosette, bare, bluish-green; stem-leaves with broad ear-like lobes at the base, clasping the stem. Inflorescence a globular corymb of many flowers. Corolla pale lilac with darker veins, very rarely white. Fruit-stems spreading horizontally. Pouch short-stalked, inversely egg-shaped. Flowers from June to September.

Fairly common amongst boulders and loose rocky debris in the alps and high alps, from 4250 to 9850 ft., very occasionally descending to 2625 ft. Especially frequent on limestone.

Alps (Western Alps to Croatia), Siebenbürgen.

The leaves taste like cress and form a favourite delicacy of chamois and chamois hunters.

Fig. 6. **Drába aizoides** L., *Immergrünes Hungerblümchen*, Yellow Alpine Whitlow Grass.*

A small plant 2–4 in. high, with a rosette of radical leaves. Leaves light green, narrow, leathery, with a comb-like fringe of stiff bristles. Stem usually bare, leafless, bearing a terminal, almost head-like corymb of bright yellow flowers. Fruiting head lengthened. Fruits oblong-eggshaped, much compressed, with 6–12 seeds in each cell. Flowers from April to August.

Fairly common on rocks and fine debris in the alps and high alps, from about 5250 to 11,150 ft.; on calcareous rocks only.

The variety *montána* Koch, which is locally common in the Swiss, Schwäbischer, and Fränkischer Jura, is distinguished by its robust habit and its racemes of many golden-yellow flowers.

The high alpine *Drába Hoppeána* Rchb. (= *D. Zahlbrucknéri* Host) has fruit-stalks ·08–·16 in. long, and extremely short styles (·03–·04 in. long) much shorter than the width of the pouch.

Mountains of Spain, Pyrenees, Cevennes, Alps, Jura, Carpathians, Balkans.

Three other species belonging to the genus *Draba* are shown in Plate 31.

Fig. 7. **Kernéra** (= *Cochleária*) **saxátilis** Rchb., *Stein-Löffelkraut.*

4–12 in. high. Radical leaves arranged in a rosette, oblong, blunt, with entire or toothed margins, somewhat rough with appressed bristly hairs; stem-leaves linear-lanceolate, the upper ones with entire margins. Flowers small, white, ·16 in. long, with a short claw. The inner, longer stamens bent at right angles in the middle. Raceme very loose when in fruit; fruit-stalks slender, spreading. Pouch globular to pear-shaped, projecting. Flowers from May to July.

Very common in stony and rocky places and in open woods in the alps and lower alps, up to about 7200 ft.; sometimes carried down to the plains by rivers (to 775 ft.), e.g. near Berne, near Höchst on the Lake of Constance, in the Schambachtal near Kipfenberg, near Munich and Landshut.

Alps, Cevennes, occasionally in the Swiss, Schwäbischer, and Fränkischer Jura, Apennines, Carpathians and Balkans. A limestone plant.

Fig. 8. **Cardámine resedifólia** L., *Resedenblätteriges Schaumkraut.*

A plant 2–6 in. high, usually putting forth several shoots but with no actual rosette of radical leaves. Lower leaves blunt, egg-shaped, stalked, undivided or 3-lobed; stem-leaves pinnate, with 2–3 pairs of leaflets and a larger terminal leaflet. Flowers white, projecting beyond the calyx. Seeds with a narrow wing at the tip. Flowers from June to August.

Stony meadows and shady slopes in the alps and high alps, from about 4900 to 10,150 ft.; sometimes lower, e.g. at 2300 ft. near Bressanone, and at 2125 ft. in the Ticino.

Pyrenees, Auvergne, Cevennes, Alps, Bayerischer Wald (Arber, Grosser Falkenstein), Riesengebirge, Gesenke, Carpathians, Siebenbürgen, Corsica, Northern Apennines. Especially frequent on primitive rocks.

In the closely-related high alpine plant *Cardámine alpina* L., almost all the leaves are entire.

Fig. 9. **Petrocállis Pyrenáica** R.Br., *Steinschmückel.*

A small plant ·8–3 in. high, forming cushions or loose carpets. Leaves small, springing from the root, crowded together in a rosette, with 3 pointed lobes at the tip, ·16–·24 in. long, fringed with hairs. Stem short, bearing a dense corymb. Flowers pink or lilac, on delicate stalklets about ·24 in. long; the latter, however, are considerably lengthened later. Petals with a short claw, broad and inversely egg-shaped, twice as long as the sepals, which stand erect and have red margins. Pouch elliptic, bare, with a short style ·04 in. long, 1-seeded. Flowers in June and July.

Occasionally found among boulders and on rocks in the high alps, from 5600 to 11,150 ft.

Pyrenees, Alps, Carpathians. Found on limestone only.

Fig. 10. **Hutchínsia alpína** R.Br., *Alpen-Gemskresse.*

Gams- or Alpenkress (Eastern Alps), Ziegerblüemli (Bernese Oberland), Creschun d'chamuotsch (Romansch-speaking Grisons).

A dainty little plant 2–5 in. high, with a rosette of radical leaves, from which there rise several simple, leafless flower-stalks. Leaves delicate, pinnate, and stalked. Raceme at first close, later loose and lengthened. Flowers small, on fairly long stalks. Petals white, twice as long as the calyx. Fruits lanceolate, ·16–·2 in. long, and about ·04 in. broad, tapering to the style, which is ·04 in. long. 1–2 seeds in each cell. Flowers from June to August.

Common amongst rocky debris and boulders, in clefts of rocks, and in alpine meadows, from about 5250 to 11,150 ft.; not uncommonly carried down to the plains by alpine rivers (by the Lech to Augsburg, by the Isar down to Landshut).

Mountains of Spain, Pyrenees, Alps, Jura, Apennines, Carpathians.

The similar species, *Hutchínsia brevicaúlis* Hoppe, occurs on primitive rocks; it is easily distinguishable from *H. alpina* by its close habit, by its shorter fruiting racemes, and by the absence of styles (i.e. the stigma is situated directly on the fruit). In both species the fruiting head lasts through the winter and thus serves to spread the seed over the snow (*Wintersteher*).


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Crassuláceae. Stonecrop Order

Plants with fleshy, undivided leaves, often forming rosettes on the ground. Stipules absent. Flowers regular, in corymbs or helicoid cymes. Sepals distinct or united. Petals 14–18. Stamens 3–30. Fruit consisting of many-seeded follicles, almost entirely separated from each other, standing erect or spreading like a star.

In the Alps the order is represented by the two genera *Sédum* and *Sempervívum*. Most species grow on dry rocks or scree slopes. The fleshy leaves absorb large quantities of water and are capable of retaining it for a long time.

Fig. 1. **Sempervívum Wulféni** Hoppe, *Gelbe Hauswurz.*

4–12 in. high. Rosette leaves sea-green, thickly fringed with glands at the edges only, otherwise bare. Calyx and upper part of stem covered with rough glandular hairs. Petals 12–18, spreading like a star, deep golden-yellow, downy and covered with glandular hairs on the outside. Flowers from June to September.

Rather uncommon; found on rocks, rocky debris, and poor pastures, from 5750 to 8550 ft.; almost exclusively on primitive rocks. From the Valais to Styria; not found in Tirol north of the Inn, or in Bavaria and Vorarlberg at all.

Fig. 2. **Sempervívum arachnoídeum** L., *Spinnweben-Hauswurz.*

Stanäpfel, Stoanäpfel (Carinthia), Geisraven (Valais).

2–5 in. high. Leaves of the rosette small, covered with very long white hairs at the tips; these hairs bind the leaf-tips together like a spider's web (in damp and shady places the coating is very slightly developed and the egg-shaped rosettes then appear green; in sunny places, on the other hand, the coating is thicker and the rosettes become quite white). Petals 8–10, bright red with a purplish-red streak down the middle. Stamens 16–20. Ovary covered with glandular hairs. Flowers from June to September.

Very widely distributed on rocks and in pastures, thickets, and woods (sometimes also on walls) in the alps, from 5600 to 9500 ft.; often descending alpine valleys to 925 ft. In Bavaria it is very occasionally found in the Algäuer Alps (Bärgündele).

Pyrenees, Alps, Central France, Apennines, Carpathians. Almost exclusively on primitive rocks. Has been planted in the Fichtelgebirge (Schlossberg Berneck).

Fig. 3. **Sempervívum tectórum** L., *Echte Hauswurz*, Common House-leek.*

Hauswürze, Dachwürze, Chämmirose, Geisrose, Geisraven, Geistolle (Switzerland), Hauslaub, Stoanäpfel, Dunerknöpf (Tirol), Zidriwurz'n (Lower Austria), Hausapfel, Hausampfer (Upper Austria), Donnerbart, Hausvater (Styria), Wilde or Alm-Rhabarber (Carinthia), Semperviva, Madragona, Fasella d'crap, Rava d'crap (Grisons).

A plant 4–24 in. high, forming globular rosettes of leaves about 3 in. in diameter, and sending out erect leafy flowering-shoots. Leaves of rosette quite bare on the surface but thickly fringed at the edges; the outer ones tapering into a sharp purplish-red spine, grass-green. Surface of stem-leaves covered with glandular hairs. Sepals usually 13, covered with glandular hairs. Petals as a rule 13, dingy reddish-pink, spreading like a star, often with glandular hairs, lanceolate, tapering, 2–3 times as long as the calyx-teeth. Stamens twice as numerous as the sepals, but some of them are sterile (*staminodia*). Ovary erect. Flowers from June to September.

Locally very abundant on rocks and in meadows of the alps and lower alps, up to about 9200 ft. It is cultivated or has naturalized itself or run wild in many other places. Since the time of Charlemagne the house-leek has been planted on roofs, chimneys, pumps, &c., as it is popularly believed to be a protection against lightning. In some districts people also value it as a medicine, and it is widely used as a cooling remedy for gout, toothache, rashes, bruises, corns, bee-stings, burns, &c.

Pyrenees, main chain of the Alps, Jura, Karst, Apennines, Northern Balkans. In

Germany it is occasionally found in Bavaria, and is also apparently wild in the middle Rhine valley, and the valleys of the Moselle, Nahe, and Ahr.

Another species, *Sempervivum montánum* L., is very common in the Central Alps. It is distinguished from the House-leek by the fact that the surfaces, edges, and tips of its rosette leaves are densely covered with glandular hairs.

Fig. 4. **Sédum atrátum** L., *Dunkler Mauerpfeffer.*

A small annual plant 1–3 in. high, bare, pale greenish-yellow, usually with reddish-brown streaks. Stem erect, usually branching from the base upwards. Leaves cylindrical or somewhat club-shaped, fleshy, blunt, sessile on the stem. Inflorescence close, terminal. Each flower has a definite stalk. Petals 5, whitish, greenish-yellow, or reddish, egg-shaped, twice as long as the calyx. Stamens 5. Follicles 5, small, spreading like a star. Flowers in July and August.

Very common in stony meadows, on rocky slopes, and in clefts of rocks in the alps and lower alps, from about 4600 to 10,150 ft., occasionally descending lower (to 725 ft.).

Pyrenees, Alps, Southern Jura, Carpathians, Apennines, North-western Balkans. On calcareous rocks only.

Saxifragáceae. Saxifrage Order

Leaves usually alternate, less frequently opposite, without stipules. Flowers solitary or forming racemes or cymes. Flowers bisexual, usually regular, with their parts in fours or fives. Stamens usually twice as numerous as the sepals. Fruit often capsular, with a beak formed from the two persistent styles, partly or altogether inferior. Seeds small and usually numerous.

At alpine levels the order is represented by numerous species which are reckoned as being typical alpine plants. To it also belong the berry-bearing currant-bushes, which are represented in the Alps by two species, *Ribes alpínum* L. (Tasteless Mountain Currant *), with flowers in erect racemes, and *Ribes petræum* Wulfen, with drooping racemes.

Fig. 5. **Saxífraga Aizóon** Jacq., *Trauben-Steinbrech.*

Silbermies (Salzburg), Stoanöpfl (Lower Austria), Wildi Huswurze, Stei-Chümi, Steiroggä (Switzerland), Wilder Scharniggel (Carinthia), Fluors da crap (Grisons).

A plant 4–18 in. high, with several rosettes of radical leaves. Leaves fleshy, tongue-shaped, sharply serrate, with small white chalk-secreting depressions at the leaf-margins. Stem erect, with but few leaves, branching into a panicle at the top and usually covered with glandular hairs. Branches of the inflorescence leafless, the middle ones with 3–5 flowers. Petals white, sometimes with red dots, rounded, inversely egg-shaped, two or three times as long as the sepals. Capsule globular. Seed elliptical, slightly warty. Flowers from May to August.

Very common on rocks, in clefts of rocks, on debris and dry boulders, and on cushions of grass in the alps and lower alps, from about 4250 to 11,200 ft.; not infrequently descending lower (to 825 ft. in the Ticino and Southern Tirol).

Pyrenees, Auvergne, Alps, Jura, Schwäbische Alb, Vosges, Nahetal, mountains of Silesia, Moravia, and Bohemia, Carpathians, Lysa Gora, Apennines (as far as Naples), Corsica, Balkans, Caucasus, and western Arctic regions to 73° N. latitude.

The rosette of leaves dies down after the flowering season. Detached parts of the cushion readily take root.

Fig. 6. **Saxífraga rotundifólia** L., *Rundblätteriger Steinbrech.*

Sanigl, Saniki (Eastern Alps), Rahmkräutl (Styria), Lungächrut, Wildes Chäslichrut (Switzerland).

A herbaceous plant 4–28 in. high. Rootstock jointed, without leaf-buds. Stem erect, with a few leaves, somewhat hairy, bearing a loose panicled inflorescence. Radical leaves long-stalked, rounded, heart- or kidney-shaped, with coarse unequal teeth, covered with fairly long soft hairs. Stem-leaves deeply cut, crenate-toothed. Sepals only slightly attached to the ovary, which is practically superior. Petals lanceolate, twice as long as the calyx, spreading like a star, white, dotted with red, often yellowish towards the bottom. Flowers from June to September.

Very common in shady or damp places in woods, on the floors of corries, and amongst mountain pine in the alps and lower alps, from about 2600 to 7200 ft.

Pyrenees, Cevennes, Alps, Carpathians, Balkans, mountains of Southern Europe, Asia Minor, Caucasus, Armenia.


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Saxifragáceae. Saxifrage Order (*Continued*)

Fig. 1. Saxífraga adscéndens L., *Aufsteigender Steinbrech.*

An annual, 1–5 in. high, densely covered with glandular hairs. Stem streaked with dark red, ascending to erect, simple or branching above the middle, leafy. Radical leaves arranged in a rosette, broadly spatula-shaped, entire or with 3–5 teeth at the tip. Petals inversely egg-shaped, milk-white. Capsule pear-shaped. Flowers from June to August.

Rare, occurring on stony places or humus at the level of the alps, from 5900 to 10,150 ft.

Pyrenees, Alps (not found in Bavaria at all), Apennines, Carpathians, Caucasus, western Arctic regions.

Fig. 2. Saxífraga moschàta Wulf., *Moschus-Steinbrech.*

·5–5 in. high, forming loose cushions or carpets with flowering and non-flowering shoots. Stem erect, more or less hairy, with leaves at intervals and a few flowers (2–3 at most). Leaves unfurrowed when fresh, showing some veins when dry, 3–5-cleft, with linear segments, less frequently entire. Petals rounded, spreading, as long as or slightly longer than the calyx, greenish-yellow, less frequently almost white, sometimes even saffron-yellow or dark purplish red. Anthers deep yellow. Ovary purplish-red. Flowers in July and August.

Common on calcareous and schistosé rocks, stationary debris, and grassy patches in the alps and high alps, from about 4900 to 13,100 ft.

Pyrenees, Auvergne, Alps, Riesengebirge, Apennines, Caucasus, Armenia, Altai Mountains, Eastern Siberia.

Fig. 3. Saxífraga exaráta Vill., *Furchen-Steinbrech.*

This species is closely related to *Saxifrága moschàta* (fig. 2), and is often confused with it. Forms fairly extensive cushions or carpets ·8–4 in. high. Stem covered with glandular hairs, dark green, sticky, bearing 4–10 flowers. Leaves oblong-wedgeshaped, entire or 2–3-cleft, with 3–5 furrows when fresh, and in the dry state 3–5 prominent veins running to the tips of the segments of the leaf. Petals yellowish-white, pure white, pink, or purple, twice as long as the sepals. Flowers in June and July.

Clefts in rocks, stationary debris and cushions of turf at the level of the alps or about the snow-line in the primitive rock regions of the Alps, from 5900 to 11,100 ft., occasionally descending to 1650 ft. Not found in Germany.

Pyrenees, Auvergne, Alps, Apennines, Caucasus.

Fig. 4. Saxífraga Seguiérii Sprengel, *Seguier's Steinbrech.*

A small plant ·5–1·5 in. high, forming broad flat cushions with numerous flower-stalks. Stem covered with glandular hairs, leafless or with one leaf, bearing 1–3 flowers. Leaves bright green, entire, blunt, fringed with glandular hairs, tapering like a wedge into the long leaf-stalk. Petals yellowish, oblong-linear, blunt, about the same length as the sepals. Flowers in July and August.

Not very common; found in clefts of rocks, in watercourses, and on moraines in the highest alps in the neighbourhood of perpetual snow, from about 6550 to 12,150 ft. Especially frequent on primitive rocks.

Central and Eastern Alps (not found in Bavaria).

Fig. 5. Saxífraga Burseriána L., *Burser's Steinbrech.*

1–3 in. high. Leaves on the short stems stiff, with a spine at the tip, oblong-linear, three-edged, overlapping one another like the tiles on a roof, dotted on the upper side, greyish-green, becoming light brown when old. Stem with one flower, red, covered with glandular hairs and small leaflets. Calyx reddish, covered with glandular hairs. Petals inversely egg-shaped, almost rounded, and spreading out fairly flat, slightly crenate at the margin, white with reddish veins. Flowers from March to June.

On limestone and dolomite rocks, from about 6550 to 7550 ft.; sometimes carried down further by streams (e.g. near St. Bartholomae on the Königsee in Upper Bavaria).

Eastern chain of the Alps (from Trentino and Eastern Bavaria, eastwards to Lower Austria and Styria), Siebenbürgen. Not found in Switzerland at all.

Saxífraga Vandéllii Sternb., found in the Southern Alps, is very like the above species, but always has more than one flower.

Fig. 6. Saxífraga aizoides L., *Fetthennen-Steinbrech*, Yellow Mountain Saxifrage.*

4–12 in. high, forming loose carpets. Stem ascending, densely leaved below, sparsely leaved above, bearing 3–12 flowers. Leaves lanceolate-linear, somewhat fleshy, fringed with short hairs and with a spine at the tip. Petals spreading, dark lemon-yellow with darker orange-red dots, sometimes saffron-yellow to dark orange-brown-red, oblong-oval. Capsule egg-shaped. Flowers from June to August.

Very common on damp boulders, wet rocks, banks of streams, and beside springs in the alps and lower alps, up to about 10,150 ft., not uncommonly carried down to the plains by alpine rivers. Flourishes on marly soil.

Pyrenees, Alps, Jura, Apennines, Carpathians, Illyria, Balkans, Arctic regions.

Sometimes forms hybrids with *Saxífraga cæsia* and *Saxífraga mutáta* L.

Fig. 7. Saxífraga stelláris L., *Sternblütiger Steinbrech*, Starry Saxifrage.*

·8–6 in. high. Rootstock forming rosettes of leaves which spread like a star. Flowering stem usually leafless. Leaves inversely egg-shaped, fleshy, shining, usually coarsely toothed

at the tip, tapering like a wedge towards the base, sparsely haired or bare. Sepals of the fairly long-stalked flowers finally turning backwards. Petals spreading, lanceolate, with a short claw, snow-white with two lemon-yellow dots. Capsule with two points. Flowers from June to August.

Common in wet places, on wet rocks, and by springs at alpine and high alpine levels, from 3950 to 9950 ft., sometimes carried down by streams (to 975 ft.).

Pyrenees, Alps, Vosges, Black Forest, Carpathians, Apennines, Balkans, Arctic regions, mountains of Northern Asia and North America.

Fig. 8. **Saxífraga áspera** L., *Rauhblätteriger Steinbrech.*

1–8 in. high, forming loose carpets. Flowering-stem ascending, bearing 1–10 flowers, with linear-lanceolate, fairly stiff, distant leaves tapering like bristles and fringed with prickles. Leaves have small leaf-buds in their axils, but the latter are smaller than the leaves. Sepals entire, tapering, often covered outside with glandular hairs. Petals oblong-inversely-egg-shaped, yellowish-white, yellow at the bottom. Anthers golden-yellow. Flowers in July and August.

Common on damp rocks, on banks of streams, and amongst debris in the alps and lower alps, from about 3275 to 9175 ft. Especially frequent on schists, gneiss, and granite, less frequent on limestone.

Pyrenees, Auvergne, Alps (not found in Bavaria at all), Northern Apennines.

Fig. 9. **Saxífraga bryoídes** L., *Moosartiger Steinbrech.*

1–2·5 in. high. The general appearance of this species is very like that of *Saxífraga áspera* L. (fig. 8). It is smaller and more compact, however, and forms dense flat cushions. Stem leaves close to each other, lying against the stem. Leaf-buds globular, close together, as long as the leaves in whose axils they are. Stem usually bearing only one flower. Flowers comparatively large. Petals almost white, somewhat yellow towards the bottom. Anthers golden yellow. Flowers in July and August.

Not uncommon in loose turf, amongst rocky debris, and in clefts of rocks in the high alps, from about 6550 to 13,100 ft. On non-calcareous subsoils only.

Eastern Pyrenees, Auvergne, Alps (in Bavaria as a rare plant in the Algäuer Alps), Riesengebirge, Carpathians, Balkans.

Fig. 10. **Saxífraga oppositifólia** L., *Roter Steinbrech*, Purple Mountain Saxifrage.*

Blaues Steinmoos (Tirol, Salzburg), Stanmies, Blaues Mies (Carinthia).

As much as 10 in. high, prostrate, much branched, usually forming dense flat cushions. Flowering stem ascending, densely covered with leaves. Leaves elliptic or oblong, blunt, somewhat fleshy, bluish-green, fringed at the edge with long non-glandular hairs, which fall off when the leaves are old. Flowers solitary, terminal. Sepals egg-shaped, blunt, hairy when young. Petals wine-coloured, later violet to blue. Flowers from May to July, according to the height at which it is growing.

Fairly common on stony expanses, amongst boulders, and in clefts of rocks in the alps and high alps, from about 5900 to 11,600 ft.; not infrequently carried down to the valleys and plains by alpine rivers and glaciers (e.g. on the banks of the Lake of Constance).

Pyrenees, Auvergne, Alps, Southern Jura, Riesengebirge, Carpathians, Balkans, Northern and Arctic Europe, Asia, and America.

The similar species *Saxífraga bifióra* L. has 2–5 flowers on a stem and darker, narrower petals.

Fig. 11. **Saxífraga cæsia** L., *Blaugrüner Steinbrech.*

Weisses Steinmoos (Drave valley), Weisses Steinmies (Carinthia).

1·5–5 in. high. The numerous short stems densely covered with overlapping leaves form a dense hemispherical cushion. Leaves curved backwards, bluish-green, with 5–7 chalk-secreting depressions, and two deep longitudinal furrows on the under side. Leaves often covered with a fairly thick, pale green calcareous incrustation. Stem bearing only a few leaves, and 1–5 flowers, bare or with scattered glandular hairs. Petals inversely egg-shaped, snow-white or somewhat yellowish, about twice as long as the calyx, 5-veined. Flowers from June to September.

Very common on limestone and dolomite rocks, on debris, and in turf in the alps and lower alps, from about 5250 to 9850 ft., sometimes descending to the plains with the rivers (in the Isartal to Schäftlarn).—Pyrenees, Alps, Apennines, Carpathians, Illyria.

Fig. 12. **Saxífraga androsácea** L., *Mannsschild-Steinbrech.*

·5–4 in. high, forming fairly dense carpets. Stem covered with glandular hairs, leafless or with 1–2 leaves, bearing 1–3 flowers. Leaves dark green, tongue-shaped, tapering to the short leaf-stalk, entire, or with 3 or more rarely 5 teeth at the tip, somewhat fleshy when fresh, fringed at the edge with glandular hairs. Sepals blunt, egg-shaped, fringed with glandular hairs. Petals white, notched, inversely egg-shaped, 2–2½ times as long as the calyx-teeth. Flowers from May to August. Very common in damp rocky places, and on accumulations of humus between rocks in the alps and high alps, from about 5900 to 9850 ft.

Pyrenees, Auvergne, Alps, Carpathians, Altai, Eastern Siberia.

Fig. 13. **Saxífraga aphýlla** Sternb., *Blattloser Steinbrech.*

A dainty little low-growing plant, ·5–1 in. high, forming loose carpets, with a creeping stem which often extends a long way. Flower-stem erect, usually with one flower. Leaves at the bottom of the stalk crowded together in a rosette, wedge-shaped, 3–5-cleft, less frequently quite entire. Petals yellowish-white, narrow, pointed, only slightly longer than the sepals. Capsule swollen so as to be almost globular, with remarkably large black shining seeds. Flowers from July to September. Among boulders in the higher alps, from 6250 to 9850 ft., invariably on limestone.

Eastern Alps (from the Bernese Alps to Upper and Lower Austria).


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Rosáceae. Rose Order

Herbs, shrubs, or trees, usually with alternate leaves, simple or compound (pinnate or palmately lobed). Stipules often present, sometimes united with the leaf-stalk. Flowers regular, solitary or in spikes, racemes, panicles or umbels. Flower-stem spreading at the top into a structure of varying shape, often cup-shaped (*cúpula*), which supports the sepals and petals and bears the stamens on its edge. Sepals 5. Petals 5 or more (8 in *Dryas*), more rarely entirely absent (Lady's Mantle). Stamens usually numerous. Fruit of various forms: nuts, drupes, berries, or capsules, not to mention spurious and collective fruits.

Fig. 1. **Sórbus** (= *Pírus*) **Chamaeméspilus** Crantz, *Alpen-Mispel, Zwerg-Mispel.*

Jochmehlbeere, Kessel- or Quantelbeere (Tirol), Mehlbeerstaude (Vorarlberg), Mehlbeere, Fagliudas, Fnetla (Grisons).

A bush 3–10 ft. high, with alternate leaves placed at wide intervals but towards the ends of the twigs closely crowded together. Leaves bare, almost leathery, short-stalked, green on both sides, simple, egg-shaped or oblong, doubly serrate, 2–3 in. long. Flowers small, in a dense terminal corymb. Calyx covered with white down. Petals erect, dark reddish-pink. Stamens about 20 in number. Ovary inferior, at first carmine, later becoming blackish, very like a small apple. Flowers in June and July.

Fairly common on rocks, bushy slopes, and pastures, and among mountain pine in the alps, from about 4600 to 7850 ft., occasionally descending to about 1650 ft. Especially frequent on chalk and flourishing in the company of alpine willows, *Alpenrosen* and mountain pine.

Pyrenees, Auvergne, Alps, Jura, Vosges (Sulzer Belchen, Hohneck), Black Forest (Feldberg), Sudetes, Carpathians, Apennines, mountains of Illyria.

Fig. 2. **Rósa alpína** L. (= *R. pendulina* L.), *Gebirgsrose, Alpen-Heckenrose.*

Rose ohne Dornen (Carinthia), Helfenstude (Valais).

A low bush, rising to 20 in. high, usually with defenceless (i.e. thornless) branches (only the young shoots have feeble, straight, bristle-like or needle-like thorns). Leaves unequally pinnate, with 7–11 leaflets, and narrow, slightly tapering, serrate stipules, edged with glands. Leaflets thin, bare, oblong-elliptic, doubly or triply serrate. Flowers bisexual, terminal, usually solitary. Sepals 5, linear-lanceolate, remaining erect after flowering. Petals 5, dark reddish-pink. Stamens numerous. Fruits (not seeds) nut-like, enclosed in a fleshy orange-red coat; the latter forms an oblong spurious fruit (hip) narrowing into a neck at the extremity. Flowers from June to August.

Very common in woods and thickets, on rocks, in pastures, from the foot of the mountains up to the alps (to about 8200 ft.), occasional specimens descending even lower. Especially frequent in thickets of *Alpenerle* and mountain pine.

Pyrenees, Auvergne, Cevennes, Alps, Vosges, Black Forest, Schwäbische Alb, Upper Swabia, Upper Bavaria, Bayerischer Wald, Rhön-, Erz-, and Riesengebirge, Gesenke, Carpathians, Apennines, Balkans. On limestone and primitive rocks.

Fig. 3. **Géum** (— *Sievérsia*) **réptans** L., *Gletscher-Petersbart.*

A plant throwing out leafy runners 2–40 in. long, creeping along the ground. Leaves interruptedly pinnate, broader above, hairy, especially on the under side. Leaflets deeply cut and serrate, with pointed teeth. Flowers very large, deep yellow. Sepals long, hairy, like the outer calyx. Fruit and styles very hairy. Styles remaining attached to the fruit, up to 1 in. long. Flowers in July and August.

On heaps of debris and moraines, and among boulders in the high alps, from 6900 to 11,150 ft., occasionally descending to 4750 ft.

Alps (in Bavaria found as a rare plant in the Algäuer Alps), Carpathians, Illyria. Prefers non-calcareous subsoils.

Fig. 4. **Géum** (= *Sievérsia*) **montánum** L., *Alpen-Petersbart*.

Benediktenkraut (Switzerland, Upper and Lower Austria), Benediktenwurzel, Benedictusblumen (Carinthia), Steinbenedix (Riesengebirge), Tüfelsabbiss, Trüebchrut, Trübwurze (Grisons), Grantiger Jäger (Salzburg), Petersbart [when in fruit], Blütewurz, Gelber Gethau, Gelber Speik [when in flower] (Eastern Tirol), Ruhrwurz, Schrietwurz (Carinthia), Wirschitz'n (Lower Austria), Nagerlwurz, Wasser-Bergwurz (Styria).

A plant 4–16 in. high, not throwing out runners. Stem usually bearing one flower. Leaves lyrate, interruptedly pinnate; terminal leaflet much bigger than the lateral leaflets, deeply cut and serrate. Stem-leaves few (2–3), sessile, 3-cleft or entire. Flowers large, ·8–1 in. across, golden-yellow, with an outer calyx. Sepals egg-shaped, tapering, hairy. Petals rounded or inversely egg-shaped. Fruit with feathery style, like a wig, with a rosy lustre. Flowers from May to August.

Very common in meadows and pastures, on heaths, and in clefts of rocks in the alps and lower alps, from about 5250 to 11,500 ft., sometimes descending even lower (to 2300 ft.).

Pyrenees, Auvergne, Jura, Alps, Apennines, Corsica, Carpathians, Balkans.

In Tirol the root is thought to have medicinal properties and people sometimes carry it in their pockets.

Fig. 5. **Alchemílla alpína** L., *Alpen-Frauenmantel*, Alpine Lady's Mantle.*

Silber- or Berg-sinau, Taubletter, Hasenchlee, Silberglätti, Silbermänteli, Silberchrut (Switzerland), Schafsuppe, Schlosskraut (Styria).

A plant 4–12 in. high, throwing out compact runners. Leaves palmately lobed almost to the base, with 5–7 segments, with a greasy lustre on the upper side when fresh, shining with silky hairs below. Leaf-segments lanceolate to oblong, deeply cut and serrate. Flowers numerous, small, bisexual, with a small, narrow outer calyx. Inflorescence coil-like. Sepals 4, yellowish, later turning upwards. Petals absent. Stamens 4. Fruit a solitary achene. Flowers from June to August.

Very widely distributed in meadows and pastures, among boulders, on rocks and rocky debris, and in open woods in the alps and lower alps, from about 4250 to 9850 ft.

Pyrenees, Cevennes, Auvergne, Corsica, Apennines, Alps, Vosges, Black Forest (Feldberg), Carpathians, Balkans, western Arctic regions.

A medicinal tea (for fever, wounds, &c.) is obtained from the dried plant.

Fig. 6. **Dryas octopétala** L., *Silberwurz*, *Silberkraut*, Mountain Avens, White Dryas.*

Weisser Gathau und Kateinl (Pinzgau), Müdla, Petersbart (Lower Austria), Frauenhaar, Frauenrosen (Carinthia), Kaisertee (Salzburg), Steichrüchere (St. Gallen).

A prostrate, many-branched shrub, forming an interlacing carpet. Stem strong. Branches readily taking root. Leaves stalked, oval to oblong-oval, bluntly crenate, with recurved margins, dark green and shining above, bare or somewhat hairy, with snow-white woolly down below, evergreen. Flowers solitary, on long stalks, fairly large. Corolla usually with 8 petals (rarely 7, frequently 9), milk-white. Fruiting head brush-like. Fruits numerous, nut-like and one-seeded, with long tails formed by the persistent, feathery, shining silver styles. Flowers from May to August.

Very common on screes, rocky slopes, and moraines in the alps and lower alps, from about 4900 to 8200 ft., especially on limestone. Often carried down into the plains by rivers (to the Lake of Geneva, Augsburg, and Munich).

Pyrenees, Auvergne, Alps, Jura, Abruzzi, Carpathians, Balkans, Caucasus, northern and Arctic regions. Formerly also found on the Meissner in Hesse.

Owing to its penetrating taproots the Mountain Avens plays an important part in consolidating limestone screes. Along with the Dwarf Birch the characteristic leaves are frequently found as fossils (the so-called *Dryastonen*) in Central Europe. The leaves are collected and made into a tea which is used medicinally.


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Rosáceae. Rose Order (*Continued*)

Fig. 1. **Potentílla aúrea** L., *Gold-Fingerkraut.*

1·5–14 in. high. Rootstock horizontal or descending obliquely, sending out rooting, ascending, somewhat hairy stems with a few flowers. Radical leaves palmately lobed, usually with 5 segments, less frequently 7. Leaflets oblong-inversely-eggshaped, usually sharply serrate at the tips only, the edges and the veins on the under side shining with silky hairs. Flowers golden-yellow, almost orange-coloured at the base. Outer calyx and calyx almost equal in length, hairy, fringed at the edges. Flowers from June to September.

Very common in meadows and on stony ground in the alps and lower alps, from 4300 to 9500 ft., sometimes descending for a long way (to 1150 ft. near Bolzano). Flourishes on calcareous soils.

Pyrenees, Alps, Jura, Black Forest, Schneeberg near Glatz, Riesengebirge, Gesenke, Carpathians, Balkans, western Arctic regions.

Fig. 2. **Potentílla grandiflóra** L., *Grossblütiges Fingerkraut.*

A handsome plant, rising to 14 in. high, throwing out flowering and non-flowering stems, which are curved and ascending. Leaves pinnate, ternate, green on both sides, with appressed hairs; leaflets inversely egg-shaped, with 3–7 fairly broad teeth on each margin. Leaf-stalk short, covered with projecting hairs. Flower-stalk with 3–10 leaves. Leaves of outer calyx linear, tapering, not longer than the sepals. Corolla usually fairly large, of the colour of the yolk of an egg. Stamens 20. Flowers in July and August.

Not very common; found in dry meadows, on stationary debris, and in clefts of rocks in the alps, from about 4900 to 9850 ft.

Pyrenees, Central and Southern Alps (not found in Bavaria).

Fig. 3. **Potentílla nítida** L., *Dolomiten-Fingerkraut.*

Silberklee, Silberraute (Carinthia).

A shrub forming dense white interlacing carpets. Radical leaves usually ternate; leaflets densely covered with silky down, with a grey lustre. Stipules large, with ear-like lobes. Stem short, usually bearing one flower. Petals broad, inversely egg-shaped, notched, twice as long as the sepals, of a beautiful reddish-pink colour, occasionally white. Receptacle shaggy with white hairs. Fruits covered with long hairs. Flowers from June to August.

Sunny limestone and dolomite rocks and screes, up to 10,350 ft.

Dauphiny, Savoy, Northern Italy, Southern Tirol, Carinthia, and Carniola.

Fig. 4. **Potentílla cauléscens** L., *Vielstengeliges Fingerkraut.*

4–12 in. high. Rootstock thick. Stem ascending, hairy, taller than the leaves. Radical leaves palmately lobed, with 5 segments, stalked. Leaflets truncate at the extremity, with 3–7 unequal teeth, tapering, thread-like, those of the upper leaves lanceolate-eggshaped. Stem many-flowered, often somewhat drooping. Petals oblong-inversely-eggshaped, truncated or notched, white, often somewhat longer than the calyx. Filaments densely covered with hairs. Fruits enclosed in hairs. Flowers from July to September.

Fairly common on sunny rocks in the alps and lower alps, from about 2950 to 7850 ft.; often descending a long way down the valleys, and in Salzburg found even on the city walls. Especially frequent on limestone.

Mountains of Spain, Cevennes, Pyrenees, Jura, Alps, Carpathians, Siebenbürgen, Balkans.

Leguminósae. Pea and Bean Order

The plants of this order usually have a vigorous taproot; the branch roots are very often covered with bacterial tubercles. Leaves usually pinnate or ternate, less frequently entire. Stipules usually present. Flowers papilionaceous, in heads or racemes. Sepals united to form a calyx with 5 teeth. Corolla irregular, with 5 petals. The odd petal, which is large and erect, is called the " standard ", the two narrow petals at the side the " wings ", and the two lower ones, which are more or less united, the " keel "; the latter serves as a landing-place for insects. Stamens 10; 9 of them are usually united to form a tube hidden in the front part of the keel, while the tenth and highest stamen remains wholly or partly distinct. Ovary superior, one-celled, lying inside the tube of filaments. Fruit a dry membranous capsule (" pod "), usually bursting open with two valves, with one or many seeds, or a lomentum.

Almost all the alpine plants belonging to this order are tender and nutritious fodder plants, which, of course, do not stand very frequent grazing.

Fig. 5. **Trifólium bádium** Schreb., *Braun-* or *Goldklee.*

4–10 in. high, biennial or triennial. Stem prostrate or ascending, tapering, cylindrical, covered with appressed hairs above, with leaves at wide intervals. Leaves ternate, long-stalked, the upper ones nearly opposite, with two egg-shaped stipules joined to the leaf-stalk and ending in sharp points. Leaflets egg-shaped or elliptic, rounded or notched at the end, finely toothed. Flower-heads usually terminal, solitary or in twos, on long stalks, at first globular, later oval. Individual flowers always on short stalks, erect and golden yellow when in flower, later reflexed and becoming a vivid chestnut brown. Flowers from June to August.

Very common in meadows and pastures and on gravelly alluvium in the alps and lower alps, almost exclusively on calcareous subsoils (the plant is a sure indication of limestone), from about 3950 to 7200 ft., occasionally ascending to 9850 ft.; sometimes carried down to the valleys by rivers.

Pyrenees, Jura, Alps, Apennines, Carpathians.

Fig. 6. **Trifólium nivále** Sieb., *Schneeweisser Alpenklee.*

2–6 in. high. Rootstock forming rosette-like lateral shoots; the latter are prostrate or ascending in curves, often with a fairly dense covering of hairs. Flowers close together, forming a head, sessile, for the most part dirty white or yellowish-white, less frequently even reddish. Flowers in July and August.

This plant is merely an alpine form of the ordinary Purple Clover * (*Trifólium praténse* L.) of the plains; for when transplanted to the plains it reverts to type even in the second year.

Pyrenees, Auvergne, Alps, Arctic regions.

Fig. 7. **Trifólium alpínum** L., *Echter Alpenklee.*

Bergsüssholz, Hahnelampe (Switzerland), Pèda galina, Zampa di galina (Grisons).

Rootstock vigorous, as much as 3 ft. long. No stem above ground; foliage and flower-stalks springing from the root. Leaves ternate, linear-lanceolate, on fairly long stalks, bare. Stipules united with the leaf-stalk, forming a long sheath. Inflorescence with 3–12 flowers, on a long stalk, longer than the leaves. Individual flowers very large, 7–8 in. long, on definite stalks, of a beautiful flesh-pink or purplish-red colour, rarely yellowish-white, reflexed after flowering, exhaling an extremely fine perfume in bright sunny weather. Pod with one or two seeds. Flowers from June to August.

Common in alpine meadows and pastures on deep fertile soil, from about 5250 to 9850 ft., but almost exclusively on primitive rocks, being found on limestone only in places (Pilatus, Tödi) where the thickness of the layer of humus is sufficient to compensate for the effect of the subsoil.

Pyrenees, Auvergne, Cevennes, Alps (not found in Bavaria at all), Northern Apennines, Siebenbürgen.

The species is considered to be a good nutritious fodder plant, and is just as good for grazing purposes as for hay. Sheep, chamois, and marmots love to browse on this plant.


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Leguminósae. Pea and Bean Order (*Continued*)

Fig. 1. **Pháca** (*Astrágalus*) **frígida** L., *Gratlinse.*

10–16 in. high, with taproots which may reach 4 ft. in length, and long, thin, scaly ground-runners; the latter are erect, unbranched, bare, somewhat zigzag, with brown membranes (formed by the growing together of the stipules) at the base. Leaves usually with 4–5 pairs of leaflets, less frequently 3–8 ; leaflets egg-shaped, blunt, with a small sharp point at the tip, dark green above, pale green below. Stipules very large, quite distinct, leaf-like, pale-green; flowers in terminal or lateral racemes, yellowish-white. Fruit oblong, slightly inflated, covered with rough hairs. Flowers in July and August.

Not very common; found in the thin turf of steep slopes, on rocky expanses and ridges, usually in places difficult of access, in the alps and high alps, from about 4900 to 8850 ft.

Alps (from Savoy to the Schneeberg near Vienna), Carpathians, Siebenbürgen, Arctic regions, Urals, Altai Mountains.

The plant is one of the latest-flowering alpine plants. It is a good fodder plant, but grazing cattle eat only the tender upper parts and leave the fairly long stumps untouched.

The closely related *Pháca alpína* L. (*Gelbe Berglinse, Alpen-Blasenschote*) has branching stems and leaves, more pairs of leaflets (9 or 11), and considerably smaller leaflets.

Fig. 2. **Oxýtropis** (*Astrágalus*) **montána** DC., *Gebirgs-Spitzkiel.*

2–6 in. high, rather bare or somewhat hairy. Leaflets egg-shaped or oblong, pointed, in as many as 19 pairs. Inflorescence of 5–15 flowers, shortened. Flower-stem about as long as the leaves. Calyx-teeth less than half the length of the calyx-tube. Corolla reddish-pink or violet (blue when dried). Pods stalked, oblong-oval, erect, somewhat inflated, covered with short black hairs, with distinct stalks ·16–·24 in. long. Flowers in July and August.

Fairly common on rocks, boulders, and alluvium in the alps, from about 5600 to 9850 ft.

Pyrenees, Alps, Jura, Apennines, Carpathians, Balkans.

All the species of the genus *Oxytropis* are distinguished by the tooth-like point at the extremity of the keel.

Fig. 3. **Oxýtropis** (*Astrágalus*) **campéstris** DC., *Alpen-Spitzkiel*, Yellow Oxytropis.*

A bushy plant 2–6 in high, forming a low flat cushion, with a vigorous, not much branched taproot going straight down into the ground. Stem above ground so short that all the hairy leaves and flower-stems appear to spring from the root. Leaves greyish-green, hairy, usually with 12 pairs of leaflets (less frequently 7–14) and a terminal one. Flower-heads long-stalked, with 10–18 flowers, which are white or yellowish-white, occasionally dull blue. Calyx-tube covered with short blackish and longer white and erect hairs. Pods erect, much inflated. Flowers in July and August.

Common on stony pastures and poor meadows in the alps, from about 5900 to 9900 ft., carried down the valleys by alpine streams to about 1300 ft.

Pyrenees, Alps (not found in Bavaria or the Swiss Jura at all), Carpathians, Balkans, northern and Arctic regions.

This plant is extraordinarily rich in albumen, and is greedily eaten by cattle, so that in easily accessible places it is nearly always found grazed down.

Fig. 4. **Coronílla vaginális** Lam., *Scheidenblätterige Kronwicke, Felsen-Peltsche.*

4–10 in. high. Stem woody below, spreading and much branched. Leaves bluish-green, usually with 9 pairs of leaflets; leaflets inversely egg-shaped. Stipules as large as the leaflets, pale, grown together, surrounding the stem like a sheath. Inflorescence with 4–8 flowers, long-stalked. Flowers brilliant yellow, somewhat streaked with red. Pods drooping, divided into 3–8 transverse compartments, each of which contains one seed and has four slight wings. Flowers from May to July.

Occasionally found in rocky places, amongst boulders, and on heathy pastures, from the plains up to the lower alps and alps, to 7325 ft. A typical limestone plant, but like *Biscutella levigata* not a genuine alpine plant. Fairly widely distributed in Southern and Central Europe, also in Thuringia and the Harz Mountains, as well as in Bohemia.

Fig. 5. **Astrágalus alpínus** L., *Alpen-Tragant*, Alpine Milk Vetch.*

3–10 in. high. Stem spreading, prostrate or ascending, at first with a slight covering of appressed hairs, with leaves at wide intervals. Leaves pinnate, with 7–12 pairs of leaflets. Stipules egg-shaped, membranous, only slightly united with the leaf-stalk. Flower-spikes with 5–15 flowers, much longer than the leaves. Flowers mottled white and violet. Wings blunt, entire. Keel nearly as long as the standard. Pods oblong, drooping, covered with rough hairs, becoming bare when ripe. Flowers in July and August.

Fairly common on pastures and amongst boulders in the alps, from about 4900 to 9200 ft.

Pyrenees, Alps, Carpathians, Caucasus, northern and Arctic regions.

Fig. 6. **Hedýsarum obscúrum** L., *Alpen-Süssklee.*

Schildkraut (Upper Austria), Blauer Hütten, Rosseisen (Salzburg, Eastern Tirol).

2–10 in. high, rarely higher. Stem erect or ascending, somewhat zigzag, with many leaves, unbranched, but with numerous side stems and brown scales at the base. Leaves unequally pinnate. Leaflets 11–19 in number, egg-shaped to lanceolate, entire, dark green and bare above, pale green below, with appressed hairs on the mid-ribs. Stipules grown together. Flower-spikes terminal, with numerous flowers (12–50), all turned to one side. Flowers of a beautiful purplish-red colour, usually drooping. Pods flattened, separating into 1–4 rounded, one-celled segments. Flowers in July and August.

Occasionally found on out-of-the-way pastures, stretches of rock, and steep slopes in the alps and high alps, from about 5600 to 9450 ft., here and there descending lower, to 1975 ft. Especially frequent on schists and limestone.

Pyrenees, Alps, Riesengebirge and Gesenke, Carpathians, Caucasus, northern and Arctic regions.

This plant and *Phàca frígida* are among the most nutritious, luxuriant, and beautiful of the alpine plants belonging to this order.

Cistáceae. Rock-Rose Order

Shrubs or subshrubs, chiefly natives of Mediterranean countries. Flowers regular, with 5 distinct sepals, 5 petals, which frequently fall off very soon, and numerous stamens. Ovary superior, one-celled. Fruit a two-valved, many-celled capsule.

Fig. 7. **Heliánthemum alpéstre** (Jacq.) DC., *Alpen-Sonnenröschen.*

A small low shrub, rising to 5 in. high. Leaves opposite, linear-oblong or egg-shaped, covered with simple or tufted hairs, less frequently almost entirely bare, or hairy only along the margins, mid-rib, and leaf-stalk. Stipules absent. Petals yellow. Stamens numerous. Fruit-stalk erect, horizontal or reflexed. Flowers from June to September.

Fairly common on rocks, in stony meadows, and in thickets of mountain pine in the alps and lower alps, from about 5600 to 9350 ft., sometimes descending a long way. Especially frequent on limestone.

Pyrenees, Alps, Apennines, Carpathians, Siebenbürgen, Balkans, Asia Minor.

The Common Rock-Rose * (*Heliánthemum vulgáre* Gaertner, *Gemeines Sonnenröschen*), which is equally common in the Alps, is distinguished from the above species by the presence of stipules and by its larger flowers.

Empetráceae. Crowberry Order

Shrubs resembling the heaths in their appearance. In the flora of Central and Arctic Europe this order is only represented by a single species. Nowadays the order is placed near the *Ericaceae* (p. 37).

Fig. 8. **Émpetrum nígrum** L., *Schwarze Rauschbeere* or *Krähenbeere*, Black Crowberry, Crakeberry.*

Stoanhoadach (Drave valley), Pickbeere (Upper Austria), Nebelbeere (Salzburg), Zinkzankbirl, Zimzamberla (Böhmerwald), Krahbeere, Stanhadach, Gamsenhadach (Carinthia), Affenbeere (Pomerania, Silesia), Durstberi, Wirbedli (Grisons), Gudelbeeri, Buebebeer (Valais), Dunkelbier (Erzgebirge), Brockenmyrte (Harz), Vineschia, Murettas (Romansch-speaking Grisons).

A small, low-growing, much-branched shrub 6–8 in. high, densely covered with evergreen leaves, rooting everywhere, forming carpets. Leaves alternate, very narrow, shining, with white ridges below, and strongly recurved margins, so that they look like needles. Flowers dioecious, small, inconspicuous, with their parts in threes, in the axils of the leaves, the male ones pale pink, the female ones of a darker shade of pink. Petals and sepals distinct. Stamens 3, dark purple. Ovary superior, with 6–9 cells. Fruit a black globular drupe with an unpleasant taste. Flowers from May to July.

Fairly common in alpine meadows, stretches of moss, *Ericaceae* turf, and bogs, from the plains up to the level of the alps, to about 8850 ft.; often in the company of *Ericaceae*.

An arctic plant distributed all over the northern hemisphere.

The plant is a sure indication of thin soil and humus. If often covers great expanses of grass and makes it unproductive. In the north the berries become much bigger, juicier, and more aromatic, and are actually eaten. Formerly the fruit was considered to be intoxicating; when eaten in large quantities it is said to cause giddiness and headache. In Northern Germany this plant is also found on the dunes; i.e. in this respect it behaves like the Red Bear-berry * (*Arctostáphylos Uva úrsi*).


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Violáceae. Violet Order

Mostly herbaceous plants with stalked alternate leaves, which are usually entire, curling inwards when young. Stipules leaf-like, often pinnatifid or fringed. The flowers of our native species exhibit bilateral symmetry and grow in the axils of the leaves. Sepals 5, persistent, often with membranous appendages at the base. Petals 5, the front one being prolonged to form a spur in which the honey exuded by the spur-like appendages of the lower stamens collects. Ovary superior. Capsule one-celled, 3-valved, with numerous seeds, usually springing open.

Fig. 1. **Víola biflóra** L., *Gelbes Veilchen.*

Gelba Almveigl, Gelbes Stiafmirtal, Milchkraut (Lower Austria), Almveigel (Carinthia), Gelbes Viönli, Bergviönli (Switzerland).

3–5 in. high. Rootstock sending out several flowering stems and a few radical leaves. Stem very delicate, usually with 2 leaves (less frequently 4) and 1 or 2 flowers (rarely 3). Leaves kidney-shaped, broader than they are long, crenate. Stipules egg-shaped, entire. Sepals pointed, lanceolate, with dwarfed appendages. Petals yellow, with brown streaks at the bottom, spreading, with a short straight spur. Flowers from May to August.

In clefts of rocks, among damp boulders, and in damp shady places in the alps and lower alps, from about 3300 to 9850 ft., sometimes descending a long way (to 325 ft.).

Pyrenees, Alps, Vosges, Upper Swabia, Riesengebirge, Sächsische Schweiz, Silesia, Westphalia (Ramsbeck), Carpathians, Caucasus, northern and Arctic regions. Has been successfully grown in the so-called Trachenschlucht in the Annatal near Eisenach since 1838. Fertilized by flies.

Fig. 2. **Víola calcaráta** L., *Langsporniges Veilchen.*

Bergviönli, Bergveyeli, Birggilge, Berglilie (Switzerland).

1·5–4 in. high. Stem creeping, thread-like. Flower-stalk bearing a solitary flower, with leaves at intervals at the base. Leaves crenate, egg-shaped, or, in the case of the upper ones, oblong or lanceolate. Stipules completely or almost completely pinnatifid. Calyx with a large appendage. Flowers large, solitary or 2–4 together, usually dark violet, sometimes yellow and white or variegated. Spur as long as the petals (·3–·6 in.). Flowers from June to August.

Locally common in meadows and pastures and on scree slopes in the higher alps, from about 5250 to 9850 ft., very rarely lower (to 1500 ft.).

Alps (in Bavaria found as a rare plant in the Algäuer Alps), Swiss Jura. Fertilized by butterflies in the day-time.

Thymelaeáceae. Daphne Order

Shrubs or herbs which have undivided leaves with entire margins. Stipules absent. Flowers bisexual, regular. Receptacle frequently prolonged to form a tube, bearing the petal-like, 4-lobed calyx on its edge. Petals absent. Stamens 8, with very short filaments placed on the receptacle. Fruit usually a berry.

Fig. 3. **Dáphne striáta** Tratt., *Steinröschen.*

Almenrausch (Bavaria, Tirol), Steinröserl (Northern Tirol, Carinthia), Bergnägerle, Bergrosen (Lechtal, Algäuer Alps), Bergspika (Achental), Alpenflieder (Switzerland).

A dwarf shrub 2–14 in. high, branching gracefully. Leaves thin, leathery, linear-wedgeshaped, blunt, with a short spine at the point, bare. Flowers terminal, in a cluster of 8–12, almost sessile, bare, pink or occasionally white, sweetly-smelling (like lilac), with fine streaks on the outside. Flower-bracts egg-shaped, with a short spine at the point, shorter than the flower. Ovary bare. Berries oblong, deep orange-red, finally brownish. Flowers from May to August.

Fairly common in dry, stony alpine meadows, on debris and rocky slopes, and amongst mountain pine, from about 5900 to 9400 ft. (as low as 2000 ft. in Southern Tirol). Not found in Western Switzerland, Salzburg, Lower or Upper Austria. A limestone plant.

Alps (from Dauphiny to Styria), Carpathians.

The poisonous Mezereon * (*Dáphne Mezéreum* L., *Seidelbast, Kellerhals*), which has red flowers and deciduous leaves, is also fairly widely distributed in the Alps.

Onagráceae. Willow Herb Order

Herbs usually with opposite, simple leaves. Stipules absent. Flowers bisexual, usually with their parts in fours, less frequently in twos, in racemose inflorescences. Stamens often twice as numerous as the petals. Styles thread-like with a knobbed or 4-cleft stigma. Ovary inferior, with numerous cells. Fruit a 4-valved many-seeded capsule or a 1–2-seeded nut, less frequently a berry or drupe.

Fig. 4. **Epilóbium Fleischéri** Hochst., *Fleischer's Weidenröschen.*

A subshrub 4–16 in. high, with subterranean runners. Stem prostrate and then ascending, branching bushily, somewhat woody, with 4 sharp edges and numerous leaves. Leaves alternate, linear-lanceolate, as much as an inch long, sessile, the same colour on both sides. Inflorescence of 5–10 flowers, almost corymbose. Flowers long-stalked, as much as half an inch across; sepals purplish-red on both sides. Petals 4, inversely egg-shaped, of a beautiful purplish-red. Style thick, only half as long as the shorter filaments, bent sharply downwards. Stigma 4-cleft. Seed rough and warty, with a tuft of hairs. Flowers in July and August.

Fairly common locally on screes and river-gravels in the alps, from about 2300 to 8850 ft.), often carried down into the plains (to 850 ft.) by rivers. Especially frequent on primitive rocks, but found on limestone also.

Alps (from Dauphiny to Tirol and Küstenland).

Umbellíferae. Umbelliferous Order

Herbs or shrubs with alternate leaves, which clasp the stem like a sheath at the base and are usually compound and repeatedly divided, less frequently entire. Stipules absent. Inflorescence usually compound, umbellate or forming a head owing to the disappearance of the flower-stalks. Flowers regular, or the outer ones may have a tendency to bilateral symmetry. Calyx small and inconspicuous. Petals 5, white, yellow, or reddish, comparatively small, inserted below the base of the style. Stamens 5, arranged regularly between the sepals. Ovary inferior, with two distinct styles, passing at the base into the stylopodium, i.e. a swollen part which secretes honey. The fruit, which contains oil, separates into two carpels, which are often ribbed, winged, or prickly; each half contains one seed. *Eryngium alpinum*, Plate 35, fig. 3, also belongs to this order.

Fig. 5. **Astrántia mínor** L., *Kleine Sterndolde.*

6–16 in. high. Stem ascending from an obliquely-growing fibrous rootstock. Radical leaves long-stalked, palmately cut, with narrow lanceolate segments; upper leaves ternate, with a long middle segment. Flowers in 2–4 simple umbels. Bracts of involucre tapering, white, usually red on the back, about the same length as the flowers. Calyx-teeth egg-shaped. Petals white. Fruit with jagged ribs. Flowers in July and August.

On rocks and stony pastures and in thickets in the alps, from about 4300 to 8200 ft. A decided limestone-hater.

Pyrenees, Alps (not found in Bavaria, and in Austria only found in Southern Tirol).

Fig. 6. **Bupleúrum ranunculoídes** L., *Hahnenfuss-Hasenohr.*

Mäuseöhrli (Bernese Oberland), Orecchio di lepre (Ticino).

2·5–20 in. high. Stem leafy, rising erectly from a thick rootstock, the upper part of which is covered with persistent remains of leaves. Radical leaves simple, lanceolate, slightly tapering, gradually narrowing into the leaf-stalk, with 3–7 veins; upper leaves usually broader at the base. Umbel of 3–15 rays, with 2–4 unequal general bracts. Partial bracts 2–4 in number, of very varying shapes. Flowers dark yellow. Flowers in July.

Here and there on pastures and rocks in the alps, from about 4600 to 8700 ft. Flourishes on limestone. In Bavaria found only in the Algäuer Alps.


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Ericáceae. Heath Order

Subshrubs, shrubs, less frequently trees, with entire leaves, which are often leathery and evergreen. Stipules absent. Flowers regular, in racemes, panicles or umbels, less frequently solitary. Corolla usually with the petals united, with 4–5 teeth. Stamens usually 8–10, arranged in two whorls; rarely only 5 in number. Anthers splitting open longitudinally, or by pores at the tip; they often have two horn-like appendages which are struck by insects visiting the flowers and, acting as the arms of a lever, serve to disseminate the pollen. Ovary superior or inferior. Fruit a many-seeded capsule or berry, less frequently a drupe with but few seeds.

Fig. 1. **Rhododéndron ferrugíneum** L., *Rostblätterige Alpenrose.*

A shrub rising to 3 ft. high, with a few vigorous branches, often leafless below. Leaves stiff, evergreen, elliptic to oblong-lanceolate, with recurved margins, dark green above, not fringed; under side at first closely speckled with waxen-yellow glands, later becoming rusty brown. Calyx-teeth always very short, broadly egg-shaped. Corolla funnel- to bell-shaped, dark purplish-red, rarely white, hairy inside. Stamens 10, hairy. Ovary egg-shaped. Fruit capsular, bursting open with 5 valves. Flowers sometimes double. Seeds spindle-shaped, about ·04 in. long. Flowers in June and July.

Common in places rich in humus in the alps and lower alps, from 4900 to 9300 ft. Especially frequent on primitive rocks and schists; rare on the limestone mountains, and there found only where thick layers of marshy soil minimize the effect of the calcareous subsoil. Often descends a long way (to 650 ft.) in damp shady ravines; found at sea-level in the chestnut woods of Ticino.

Pyrenees, Corbières, Alps, Jura, Upper Swabia, Illyria, Northern Apennines.

The glandular scales of the leaves are strongly hygroscopic (i.e. readily absorb water) and protect the plant from too rapid transpiration. They also contain balsam-like and resinous substances.

At the bottom of the corolla there is a nectary, the honey of which is often stolen by insects which bore holes through from outside. Brilliantly coloured galls, the so-called " Alpenrosenäpfel " or " Saftäpfel ", are very often found on bushes of *Alpenrosen*; these are due to a harmless fungus (*Exobasídium rhododéndri* Cramer). The under sides of the leaves are often covered with a black fluffy tangled mass of threads, likewise caused by a fungus (*Apiospórium rhododéndri* Fuckel).

Fig. 2. **Rhododéndron hirsútum** L., *Bewimperte Alpenrose, Steinrose, Almrausch.*

A low, densely-leaved shrub, with short, much-branched twigs. Leaves evergreen, elliptic, thin, of a vivid green colour, somewhat crenate at the margin, fringed with long hairs; under side also green when fully grown, with brown glandular scales at intervals. Inflorescence corymbose, with 3–10 flowers. Calyx-teeth lanceolate, tapering, longer than they are broad. Corolla funnel- to bell-shaped, somewhat irregular, with a 5-lobed edge, light red. Corolla-tube hairy inside. Fruit capsular. Flowers in June and July.

Common on dry rocks and among boulders and mountain pine, from 5250 to 8450 ft., sometimes descending a long way (to 975 ft.). Found on limestone. Central and Eastern Alps.

Fig. 3. **Rhodothámnus** (*Rhododéndron*) **Chamaecístus** L., *Zwerg-Alpenrose.*

A low, graceful shrub 4–16 in. high. Stem turning upwards, forked, with the leaves closer towards the ends of the branches. Leaves oblong-lanceolate, pointed, serrate, fringed with fine hairs, evergreen. Flower-stalks and calyx-teeth hairy. Flowers usually in twos, erect, long-stalked. Corolla bluish- to reddish-pink, spreading like a wheel, ·5–1 in. across, almost completely divided into 5 rounded lobes. Stamens 10, spreading; anthers blackish-brown. Fruit capsular. Flowers from May to July.

Stony, bushy slopes in the eastern limestone Alps, from 3950 to 7200 ft., sometimes descending lower (to 1150 ft.). Not found in Vorarlberg or Switzerland.—Eastern Alps to the Karawanken.

Fig. 4. **Vaccínium Vítis-Idæa** L., *Preisselbeere*, Red Whortleberry, Cowberry.*

Ranklbeer, Kranklbeer (Austria), Granten, Grandlbeer (Bavaria, Austria), Grüfle (Grisons), Riffli (Berne), Gialüdas, Frinna, Garnadel (Romansch-speaking Grisons).

A small shrub 4–12 in. high. Stem tapering, cylindrical (not winged with sharp edges as in the case of the Bilberry *). Leaves inversely egg-shaped, leathery, evergreen, with recurved margins, slightly crenate; under side light green, dotted with glands at intervals, prominently veined. Flowers in graceful terminal racemes. Corolla bell- to pitcher-shaped, white, usually streaked with red. Filaments hairy. Ovary inferior. Fruit a globular crimson (rarely white) berry, crowned by the calyx-margins. Normally flowers twice a year, first in May and then again in August; but in high situations the second flowering does not take place.

Woods, heaths, marshes, and alpine pastures, often covering great expanses; from the plains up to the level of the alps, to 9975 ft. A sure indication of humus

Fig. 5. **Vaccínium uliginósum** L., *Moorbeere*, Bog Whortleberry, Great Bilberry.*

Rauschbeeri, Munibeeri, Schnuderbeeri, Mehlbeeri (Switzerland), Schwindelbeer (Lower Austria), Filzklober, Zoglbeer (Böhmerwald), Moosfakken, Nebelbeer, Sturlbeer (Tirol), Auzuns Pudla, Bludérs, Uzun d'luf (Romansch-speaking Grisons), Podlouses (Val di Gardena).

A subshrub, 6–35 in. high, ascending or erect. Stem tapering, cylindrical. Leaves expanding in May and falling in October, inversely egg-shaped, blunt or rounded, entire, with slightly recurved margins, bluish-green below, with a prominent network of veins. Racemes containing only a few flowers, the latter being on short stalks, drooping. Margin of calyx 5-cleft. Corolla pitcher-shaped, white or pink, with 4 or 5 teeth. Berries bluish-black, with a beautiful steely-blue bloom, rarely greenish-white, with many seeds, crowned by the calyx, larger than the fruit of the Bilberry *, and with colourless juice. Flowers from May to July.

Marshy woods, peat bogs, and accumulations of humus; fairly common from the plains to the level of the alps, rising to 10,150 ft. Widely distributed over Europe, Siberia, and Northern and Arctic America.

Fig. 6. **Erica cárnea** L., *Frühlingsheide*, *Schneeheide*, Mediterranean Heath.*

Bäsareis, Bröl, Brauch, Brüsch, Bischelbruch, Prisi, Sör, Krass (Switzerland), Riblehard (Algäuer Alps), Hoadoch, Hoaderer, Rote Grampen (Tirol), Sende, Senerer, Senden (Austria), Bröl, Brutg, Brui (Grisons), Erica minore, Brughere (Italy).

A low, much-branched shrub, with rigid prostrate and ascending branches. Leaves pointed, almost needle-shaped, evergreen, growing in whorls of 4. Flowers in a terminal raceme, all facing one way, visible even in autumn as pale green buds and opening with the first warming beams of the spring sun. Corolla flesh-pink, rarely white, oblong-pitcher-shaped, almost twice as long as the calyx, with a 4-toothed edge. Anthers dark brown, projecting from the corolla; stamens without appendages. Fruit capsular, 4-celled, enclosed in the corolla. Flowers from March to June; one of the first signs of the approach of spring, sometimes flowering even in midwinter.

Widely distributed on pastures, sunny slopes, screes, and rocky heaths, and in fir woods, up to the level of the alps, rising to 8950 ft. Especially frequent on limestone or calcareous schists. Widely distributed in Central and Southern Europe.

In Tirol this is considered an excellent honey plant; hence the peasants frequently move their hives to places where it is growing.

Fig. 7. **Loiseleúria** (= *Azálea*) **procúmbens** Desv., *Azalee*, Trailing Azalea.*

Falderen, Gamshoadach, Rausch, Wilde Alpenrose (Tirol), Klein's Rauschkräutl (Lower Austria), Gamshadach, Standhadach (Carinthia), Chrizlibeeri (Switzerland).

A low, much-branched shrub, forming a carpet, with fairly densely leaved branches 6–18 in. long. Leaves more or less opposite, leathery, evergreen, narrow and elliptic, entire, with recurved margins and a thick midrib. Umbels with few flowers (2–5). Calyx dark red. Corolla tube- to bell-shaped, 5-cleft, open, reddish-pink, very rarely white. Stamens 5. Fruit a capsule with 2–3 cells. Flowers from June to August.

Fairly common on ridges and masses of rock and amongst mountain pine in the high alps from about (4100) 5600 to 9850 ft. Flourishes on schists and in the company of lichens. This species is found carpeting the ground in alpine woods of spruce and stone pine. In the lapse of time the plant may form quite considerable layers of peat and may gradually cover stones completely. Northern and Arctic regions.

Fig. 8. **Arctostáphylos** (*Arctóus*) **alpína** Sprengel, *Alpen-Bärentraube*, Black Bear-berry.*

A dwarf, extensively-creeping shrub, with short terminal shoots. Leaves thin, herbaceous, lanceolate, with finely serrate margins, tapering towards the stalk, slightly fringed, with a network of veins on both sides, deciduous, ruby red in autumn. Racemes short, terminal, with 2–5 greenish-white flowers. Corolla pitcher-shaped, with reflexed teeth. Fruit a globular drupe, red when unripe, later becoming bluish-black. Flowers in May and June.

Dry and rocky places, among mountain pine, and in larch woods in the alps, from 6250 to 8700 ft., occasionally descending to 2800 ft. Shows a decided preference for limestone.

Pyrenees, Alps, Jura, Carpathians, Balkans, northern and Arctic regions.

Fig. 9. **Arctostáphylos Úva úrsi** Spr., *Immergrüne Bärentraube*, Red Bear-berry.*

Rausch, Rauschgranten (Tirol, Lower Austria), Granten, Mehlgranten, Stoangranten (Carinthia), Bergrauschlaub (Tirol), Sandbeeri, Wolfsbeeri, Chleckbeeri, Wilder Buchs, Buchsbeeri, Garle (Switzerland), Gigludras d'crap, Gigludras d'lain, Gaglidras salvatgas, Farinarsa, Gajuda (Romansch-speaking Grisons), Rausha (Val de Gardena).

A long, branched, prostrate shrub forming large carpets, with branches 1–3 ft. long, i.e. a characteristic "carpet-plant". Leaves evergreen, inversely-eggshaped or oblong, leathery, entire, very like those of the Cowberry *, but with no glandular dots on the under side and without recurved margins. Racemes terminal, drooping, with few flowers (3–12). Corolla pitcher-shaped, with 5 reflexed teeth, white or pale pink. Stamens 10, opening with pores. Ovary superior. Fruit a scarlet drupe, rarely white, with mealy flesh. Flowers in March and April. The flowers are one of the signs of approaching spring in the alps. The leaves yield a tea which is highly thought of for renal disorders.

Rocks, stony places, sunny pastures on thin soil, and heathy meadows, up to about 9125 ft.


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Primuláceae. Primrose Order

Herbs with radical leaves arranged in a rosette, usually entire. Stipules absent. Inflorescence usually containing several flowers, umbellate or panicled. Individual flowers usually regular, with their parts in fives; sometimes dimorphous, i.e. some plants bear long-styled flowers, others short-styled flowers (heterostylism). Calyx with the sepals united, usually 5-cleft, persisting for a long time. Corolla with the petals united, either bell-shaped or tube-shaped with a wheel- or funnel-shaped limb. Stamens 5, placed in front of the segments of the corolla. Ovary superior, with an undivided style and a stigma like the head of a pin. Fruit one-celled, capsular, usually with numerous seeds.

The *Primulas* are among the most typical plants of the European chain of the Alps. Only a few species, like *Primula farinosa* (Bird's Eye Primrose *), *Androsace Chamaejasme*, and *Cortusa Matthioli*, are more widely distributed, being found in northern Asia and also in Arctic regions. The Common Cyclamen * (*Cyclámen Européum* L., *Alpenveilchen*) is not uncommon in lower situations where the climate is mild; it is a bulbous plant with nodding reddish-violet flowers and kidney- or heart-shaped evergreen leaves.

Fig. 1. **Prímula Clusiána** Tausch, *Clusius-Primel.*

Blaua Petergstamm (Lower Austria, Styria), Stoanresl (Lower Austria), Petersbart (Styria).

·8–4 in. high. Leaves grass-green, shining above, oval or oblong-oval, rounded at the tip, with narrow whitish cartilaginous margins. Scape with 2–5 flowers, covered, like the flowers, with fine glands. Segments of corolla cleft in two to about the middle, reddish-pink, usually lilac when fading; outer and inner surfaces of tube whitish. Margins of corolla forming a wide funnel. Bracts narrow, up to ·7 in. long, as long as or longer than the flower-stalks. Flowers from May to July.

On precipices and among boulders in the alps and lower alps, from 5600 to 7200 ft., sometimes descending to 1650 ft. Found on limestone.

Only in the northern chain of the Eastern Alps, from Eastern Bavaria (Saletalpe, Fischunkel) through Salzburg, Upper Austria, and Lower Austria to Northern Styria.

Fig. 2. **Prímula mínima** L., *Zwerg-Primel.*

Gamsbleaml, Platenigen (Zillertal), Saupeterstamm (Carinthia), Sauspeik (Eastern Tirol), Ross-speik (Styria), Abbiss, Teufelsanbiss (Salzburg), Habmichlieb (Riesengebirge).

·2 to 1·5 in. high. Rootstock brown, prostrate, sending out many shoots. Leaves wedge-shaped, almost sessile, shining, without cartilaginous margins, bare, truncated at the extremity, with large cartilaginous serrations. Scape usually very short, generally shorter than the leaves. Bracts 1–2, linear to lanceolate, not more than ·25 in. long. Flowers brilliant red, turning paler when fading, rarely white. Inner and outer surfaces of corolla-tube white. Segments of corolla deeply cleft. Flowers in June and July.

Damp rocky pastures and stony alpine meadows, from 5250 to 9850 ft. Found on non-calcareous soils (a schist-loving plant).

Eastern chain of the Alps, as far west as Tirol and Italy (Belluno), but not in Switzerland; also in the Riesengebirge, Carpathians, Siebenbürgen, and the Balkan Mountains. In Bavaria only in the neighbourhood of Berchtesgaden (from the Reiteralpe eastwards) and in the Karwendel.

Fig. 3. **Prímula integrifólia** L., *Ganzrandige Primel.*

·5–2·5 in. high. Rootstock short and thick, brownish-black. Leaves soft, grass-green, rather shiny, entire, oblong or elliptic, sparsely haired (partly with glandular hairs) like the other green parts of the plant, very slightly sticky. Bracts very narrow, longer than the short flower-stalks, always projecting beyond the bottom of the calyx, which lies loosely against them. Calyx usually streaked with red, always shorter than the corolla-tube. Corolla dull violet. Tube densely covered with soft glandular hairs, so that it appears white. Flowers in June and July.

Occasionally found in damp pastures and in " snowy valleys ", from 4950 to 10,000 ft. Found on limestone and schists.

Pyrenees, Switzerland, Val Tellina, Vorarlberg, and Western Tirol; but not found either in the Eastern Alps or in the western parts of the Swiss Alps.

Fig. 4. **Prímula glutinósa** Wulf., *Klebrige Primel.*

Blauer Speik, Speik, Ross-speik (Tirol, Salzburg, Styria), Frauenspeik, Petergstamm, Petersbart, Weisser Speik (Styria).

·6–2·75 in. high. Rootstock sending out many shoots, thick, brownish-black. Leaves rather stiff, with a dull lustre, covered with dark dots above, lanceolate to wedge-shaped, gradually tapering to the broad leaf-stalk, usually toothed at the extremity, very sticky. Scape with 1–7 flowers; individual flowers almost sessile, without stalks, with a strong perfume, very sticky, at first dark blue, later dingy violet, lilac when fading, very rarely white. Bracts broadly oval, as long as the calyx. Flowers in July and August.

On damp clayey debris and thin turf, occasionally also in clefts of rocks in the alps and high alps, from 5900 to 10,150 ft. Only on non-calcareous rocks (a schist-loving plant).

Eastern Grisons, Tirol, Salzburg, Carinthia, Styria, Central Bosnia. Not found in the Bavarian Alps.

Fig. 5. **Prímula farinósa** L., *Mehlprimel*, Bird's Eye Primrose.*

Moosblümel, Frauenäugl, Unserfrauenäugl, Kreuzbleaml (Tirol), Chrüzblüemli, Chrütztli, Rietäugli, Kesseli, Mühlerädli (Switzerland), Hennaäugli (Vorarlberg), Regenrösli, Kaiserli (Bernese Oberland), Fluors da Santa Catharina, Mangs da Nussigner (Romansch-speaking Grisons).

2–12 in. high. In contradistinction to the other alpine *Primulas*, the leaves are rolled backwards (outwards) in the young state (vernation); slightly shiny on the upper side and often somewhat wrinkled, inversely egg-shaped to oblong, densely covered with meal below, with crenate or serrate margins. The end of the scape and the calyx are also more or less thickly covered with white powder. Scape usually much longer than the leaves. Umbel of many flowers. Bracts narrow, pointed, with a sac-like swelling at the base. Corolla reddish-lilac to light purple, less frequently bluish-lilac, dark purple or pure white, with a deep yellow tube; segments of corolla 2-cleft. Flowers from May to July.

Marshy, boggy places and damp pastures; abundant and widely distributed from the plains up to about 9075 ft.

Mountains and low ground in Central and Southern Europe, Northern Europe, Northern Asia, Andes, Antarctic regions of South America, Tierra del Fuego, and Falkland Islands.

In the lowlands the Birds' Eye Primrose has a short broad calyx-tube and is therefore chiefly fertilized by bumble-bees (*Hummelblume*), while in the alps it exhibits a narrower, longer tube, so that certain butterflies can reach the nectar by day (*Falterblume*).

A near relative of the Birds' Eye Primrose is the beautiful *Prímula longiflóra* All., which is of a more robust growth and is well distinguished by its large flowers with long tubes (corolla-tube ·8–1 in. long). It is not found in the Alps of Bavaria, Styria, or Upper and Lower Austria.

Fig. 6. **Prímula Aurícula** L., *Aurikel, Ohrprimel*, Auricula.

Gambsbleaml, Dolanotsch, Zollitsch, Peterstamm (Upper Austria), Bergnagerl, Gelbe Kraftblueme (Upper Austria), Gelber Sanikel, Schwindelkraut, Stei-Plagente (Bavaria), Gelber Scharniggl (Carinthia), Patenigl, Platening, Gelber or Wilder Speik, Rickelar, Batöngen (Tirol), Frühblume, Florblüemli, Steischüsseli, Alphändscheli (Switzerland), Schrofmadänge (Vorarlberg), Barillon, Ganguelin, Gangueillon (Western Switzerland), Oreggia d'ors (Ticino).

2–10 in. high. Rootstock vigorous, often branched. Leaves thick, fleshy, with cartilaginous margins, rounded to inversely egg-shaped, tapering to the leaf-stalk, entire or with wavy or toothed margins, usually shorter than the flower-stalk. All the green parts, and especially the leaf-margins and calyx, are usually covered with mealy powder. Scape with 4–12 sweetly smelling flowers, usually bright yellow (less frequently yellowish-brown). Calyx bell-shaped, often shorter than the corolla-tube. Flowers from May to July.

Very widely distributed on rocks in alpine and sub-alpine regions, from about 5250 to 8200 ft.; especially frequent on limestone. Sometimes descends the valleys (to 820 ft.) and spreads on to the plateaux, e.g. in Bavaria as far as the neighbourhood of Munich, where it grows in marshy meadows along with *Gentiana acaulis* (Plate 22, fig. 1) and *Bartsia alpina* (Plate 26, fig. 3).

Pyrenees, Alps, Jura, Black Forest, Fränkischer Jura (gorge of the Danube between Kelheim and Weltenburg), Apennines, Carpathians, Banat, Northern Serbia.

Fig. 7. **Prímula hirsúta** All., (= *P. viscósa* Vill.), *Leim-Primel*.

Chläbeni, Klebi, Muttergottesmeil (Switzerland), Primola untuosa, Sassireu (Ticino).

·5–2·75 in. high. Surface of the green parts densely covered with very small, sticky, colourless or yellowish glandular hairs, to which small grains of sand adhere. Leaves rounded, oval, suddenly tapering into the leaf-stalk, usually coarsely toothed, somewhat fleshy. Scape with 1–17 flowers, usually shorter than the leaves. Bracts a quarter to a third as long as the flower-stalks, which are ·2–·4 in. long. Flowers pink with a tinge of blue, sometimes pure white. Inner and outer surfaces of the tube whitish. Fruit-capsule enclosed in the calyx. Flowers from April to June.

In clefts of rocks in the higher granite alps, from 4900 to 11,800 ft.; here and there descending to the bottom of the valleys (to 755 ft. near Lago Maggiore). Only found on primitive rocks.

Western Alps, Switzerland, Tirol, Salzburg, Lombardy; not found in Bavaria, Lower and Upper Austria, Styria, Carinthia, or Carniola.

Fig. 8. **Gregória** (= *Douglásia*, = *Arétia*) **Vitaliána** Duby, *Gold-Primel*.

2–8 in. high. A low-growing, dainty little plant, forming a carpet, with branched prostrate stems. Leaves crowded together in a rosette, narrow and linear, with soft stellate hairs on the under side and along the margin. Flowers solitary, short-stalked, about ·4 in. long, tube- to plate-shaped, deep yellow, green when dried. Corolla-tube twice as long as the calyx. Lobes of corolla 5, spreading out flat, rounded at the tip, less frequently slightly notched; tube with 5 short scales. Capsule with 2–3 seeds. Flowers from May to August.

On rocks and pastures in the higher alps from about 5600 to 10,150 ft. Fairly common in Southern Tirol, in the southern Pennine Alps (e.g. on the southern slope of the Gemmi), and in Ticino (Alpi di Pianascio above Fusio and Campolungo).—Sierra Nevada, Pyrenees, Mont Ventoux, Western and Southern Alps.


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Primuláceae. Primrose Order (*Continued*)

Fig. 1. Andrósace Chamaejásme Wulfen, *Zwerg-Mannsschild.*

A small plant ·8–4 in. high, forming loose carpets and sending out flowering and non-flowering stems. Leaves lanceolate, entire, tapering at the bottom, fringed at the edge and at the tip with distinctly jointed hairs, bare on the surface, forming a loose flat spreading rosette. Scape and umbel downy, with long hairs, which are also jointed, and short glandular hairs. Corolla white or reddish, with a yellow tube. Flowers from June to August.

On rocks and stony meadows, especially in the limestone alps, from 5250 to 9850 ft. occasionally descending to 1975 ft.

Pyrenees, Alps, Carpathians, Siebenbürgen, Caucasus, Urals, Altai Mountains, Himalayas, Arctic regions.

Fig. 2. Andrósace villósa L., *Zottiger Mannsschild.*

1–2·5 in. high, forming hemispherical rosettes. Leaves covered on both sides, especially in the upper third, with long, soft, shining, silky hairs, which are crowded together like a brush at the leaf-tip. Corolla white or reddish, with a yellow tube. Bracts 1–2 times the length of the flower-stalks. Flowers in June.

Turf and rocks in the Southern Alps (Carinthia, Styria, and Carniola), Siebenbürgen and Balkans. Not found in Bavaria; in Switzerland only found on the high western summits of the Jura (Dôle). A limestone-loving plant.

Fig. 3. Andrósace obtusifólia All., *Stumpfblätteriger Mannsschild.*

2–4 in. high. Leaves in a spreading rosette, entire, oblong-inversely-eggshaped or lanceolate, blunt, covered with stellate and forked hairs, fringed at the edge, nearly bare on the surfaces, with short hairs. Calyx distinctly hairy. Corolla white to pale reddish, with a yellow tube. Flower-stalks broadening and somewhat club-shaped above, 2–4 times as long as the bracts. Flowers in June and July.

Dry pastures in the alps, from about 5900 to 11,150 ft. On non-calcareous subsoils.

Alps, Gesenke (only in the Kleine Schneegrube), Carpathians, Siebenbürgen, Apennines.

Fig. 4. Andrósace láctea L., *Milchweisser Mannsschild.*

A small plant 2–6 in. high, forming loose carpets. Rootstock branched, giving off stems bearing flowering and non-flowering rosettes. Leaves narrow, lanceolate-linear, entire, tapering, ·6–·8 in. long, sparsely haired at the tip or along the margin. Scape erect or ascending, like the flower-stalks and calyx quite bare, bearing an umbel of 2–4, rarely more, flowers (stunted specimens sometimes have only one flower). Flower-stalks several times as long as the small bracts. Corolla pure white, with notched segments and a yellow tube. Flowers from June to August.

Fairly common on rocks in the limestone alps, from about 5250 to 7200 ft., sometimes lower.

Western Alps, Schwäbische Alb (Bronnen, Beuron), Eastern Alps (from the Algäuer Alps and Monte Baldo eastwards), Carpathians, Siebenbürgen, Western Balkans. In Switzerland found only in the Central Jura, the Stockhorn and Justistal chains and the Freiburger Alpen.

Fig. 5. Andrósace cárnea L., *Fleischroter Mannsschild.*

A low-growing little plant ·8–3 in. high, forming a carpet, giving off stems bearing flowering and non-flowering rosettes, but more compact than the previous species. Scape and flower-stalks covered with downy hairs. Leaves linear, entire, bent back at the tips, fringed with short hairs. Bracts about the same length as the flower-stalks. Corolla flesh-pink with a yellow tube, rarely white, with rounded segments. Flowers in June and July.

Occasionally found on fresh debris and in damp turf, in the high alps, from about 6550 to 9850 ft. Found only on primitive rocks.

Pyrenees, Auvergne, Vosges (Sulzer Belchen, 4600 ft.), Western Alps, Western Switzerland (Ticino, Valais, and Vaud).

Fig. 6. Andrósace Helvética (L.) Gaud., *Schweizer-Mannsschild.*

A small silvery-looking plant ·8–2 in. high, forming a very dense compact hemispherical cushion. Branches club-shaped, thickly covered with leaves overlapping like the tiles on a roof. Leaves very small, ·1 in. long, covered with thick short spreading or reflexed hairs. Flowers solitary, terminal, almost sessile. Corolla white, rarely reddish, with a yellow tube. Flowers from May to July.

In clefts of rocks in the high alps, from about 5250 to 11,500 ft. Found on limestone only.

Alps (Western Alps to Upper Austria and Northern Styria).

When not in flower the plant bears a strong resemblance to a rock-lichen. In sunny weather the flowers have a very strong perfume.

Fig. 7. **Andrósace alpína** (L.) Lam. (= *Andrósace glaciális* Hoppe), *Gletscher-Mannsschild, Gletscher-Moos.*

A small plant ·8–2 in. high, forming loose carpets. Leaves lanceolate, close together, crowded together in a rosette at the end of the branches, covered like the calyx and flower-stalks with very short forked or stellate hairs. Flowers solitary, terminal, on definite stalks. Corolla reddish-pink or white, with a yellow tube.

Rocks and heaps of debris in the high alps, from about 6400 to 13,800 ft. Found on primitive rocks.

Central chain of the Alps (from Dauphiny to Salzburg, Carinthia, and Styria). Said to be found on the Schneibstein in Eastern Bavaria.

Fig. 8. **Cortúsa Matthíoli** L., *Alpen-Glöckel, Matthiolus-Primel.*

6–20 in. high. Rootstock short, perennial. Leaves springing from the root, long-stalked, almost circular, with 11–13 lobes, coarsely and unevenly toothed, and like the whole plant more or less hairy. Scape with a terminal umbel of flowers. Flowers 3–12, long-stalked, nodding, sweet-smelling, with short narrow bracts at the base of the umbel. Corolla reddish-pink, very rarely white, funnel-shaped, twice as long as the calyx. Flowers from June to August.

Occasionally found on damp rocks and in shady woody places in the eastern valleys of the Alps, from about 3600 to 6250 ft. In Switzerland found only in the Lower Engadine and the Münstertal.

Alps (from the Maritime Alps to Styria and Lower Austria), Moravia (Blansko), Carpathians, Siebenbürgen, Northern Central Russia, Himalayas, Northern Asia, Japan.

Fig. 9. **Soldanélla mínima** Hoppe, *Kleinstes Alpenglöckchen.*

·8–3·5 in. high. Leaves very small, circular, entire, not notched and usually quite rounded at the base. Young flower- and leaf-stalks covered with downy glandular hairs. Flowers drooping. Corolla pale lilac, streaked with violet inside, cylindrical to bell-shaped, slightly cleft (to a quarter or a third of its depth), the separate segments somewhat spreading. Anthers rounded at the base. Style shorter than the corolla. Flowers from May to July.

Occasionally found on damp calcareous soil rich in humus, in the eastern chain of the Alps, from Tirol and Northern Italy (Val Tellina, Monte Baldo) to Styria. Not found in Switzerland or Bavaria.

Fig. 10. **Soldanélla alpína** L., *Echtes Alpenglöckchen.*

Almglöckerl (Lower Austria), Schneeglöckl, Schneereasel (Carinthia), Alpenglöggli, Blaues Schneeglöggli, Guggerchäs, Tüfelsgsichtli (Switzerland), Schneeglöckl, Schneeglöckelar, Eisglöckl, Schneenagelen, Drattelblume (Tirol), Brunsina, Bransina (Grisons).

2–6 in. high, with a brown perennial rootstock descending obliquely. Leaves springing from the root, rounded, kidney-shaped, entire, broadly notched at the base. Scape erect, leafless, bearing 2–3 flowers. Flower-stalks somewhat rough with small sessile glands, later becoming bare; flowers violet to azure-blue, nodding or standing up obliquely. Corolla divided half-way down into a dainty fringe, with 5 small scales inside tube. Style longer than the corolla. Fruit capsular, one-celled, with numerous seeds. Flowers from April to June.

Very common in luxuriant meadows and at the edge of snow-fields in the alps and lower alps, from about 4900 to 9850 ft., sometimes descending a long way (to 1650 ft.). Flourishes on limestone.

Pyrenees, Auvergne, Alps, summits of the Jura, Black Forest (Feldberg), Apennines, Carpathians, Eastern Balkans.

A very closely-related species, *Soldanélla montána* Mik., is widely distributed in coniferous woods, where the soil is rich in humus, in the eastern chain of the Alps, and also in the Bayerischer Wald, Bohemia, and the Carpathians; it may be distinguished from the foregoing by its considerable size (4–8 in.), flower-stalks covered with downy glandular hairs, and comparatively numerous flowers (as many as 6).

Fig. 11. **Soldanélla pusílla** Baumg., *Kleines Alpenglöckchen.*

·8–4 in. high, remarkably small in all its parts. Leaves springing from the root, rounded-kidney-shaped, dotted on the under side, broadly notched at the base. Scape bearing a solitary flower, or less frequently two flowers. Leaf-stalk, scape, and flower-stalks covered when young with small sessile glands. Flowers nodding or drooping. Corolla tube- or bell-shaped, pinkish-lilac, sometimes white, not very deeply divided (a fourth of the way down), without any scales in the tube. Anthers tapering at the base. Flowers from May to August.

Common in damp meadows and " snowy valleys " of the alps, from about 4900 to 10,150 ft. Especially frequent on primitive rocks.

Alps (Switzerland and Monte Baldo to Styria), Eastern Carpathians, Balkans, Apennines.

The *Soldanellas*, like *Crocus vernus*, *Ranunculus alpestris*, *Anemone vernalis*, &c., are one of the first signs of the approach of spring in the Alps. Sometimes these plants break right through the snow covering them. The ability of the *Soldanellas* to melt their way through the soft loosened covering of snow is due to the warming of the dark flowers and stems by the sun's rays. Occasionally the calyx takes a petal-like (petaloid) form. The little seeds weigh ·24 mg. (·0037 grain).


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Gentianáceae. Gentian Order

Annual or perennial herbs, without hairs, usually with a bitter taste. Leaves generally opposite, without stipules, usually undivided and entire. Flowers bisexual. Calyx usually 4- or 5-cleft (less frequently 4–7-cleft). Corolla usually of a beautiful blue colour, often forming a tube at the base, sometimes fringed inside. Stamens as numerous as the petals and placed between them. Ovary superior, 2-celled. Stigma knobbed or 2-cleft. Fruit usually a capsule bursting open with two valves.

Fig. 1. **Gentiána acaúlis** L. (part) (= *G. vulgáris* Beck, = *G. Clúsii* Perr. et Song.), *Grossblütiger Enzian.*

Blauer Fingerhut, Steiglogge, Chessler, Chlepfer, Bitterwörzli (Switzerland), Guggerschuh, Schneller, Blaue Hosen, Pfaffenhosen, Pfaffenkuttel, Pfatscher, Bodenglocken, Gugguhandschuh (Tirol), Holzgluck'n, Bitterwurz (Lower Austria), Fingerschuh, Kukurantschen, Guggubüschel (Carinthia), Almglocken, Kardaunglocke (Salzburg), Pluffers, Flur da schlops, Calderon (Romansch-speaking Grisons).

1·5–4 in. high. Stem low, often minute, with rather sharp edges. Radical leaves somewhat stiff and leathery, lanceolate to elliptic-lanceolate, rather sharply pointed, broadest at or below the middle. Stem-leaves considerably smaller, sharply tapering. Calyx erect, never contracted, lying closely against the corolla. Calyx-teeth as long as, or somewhat longer than, half the calyx-tube; hollow between the calyx-teeth usually pointed. Corolla bell-shaped, expanding like a funnel from the base upwards, dark azure-blue, somewhat greenish-blue outside, rarely sky-blue or quite white, with no green spots inside, 2–2·5 in. long. Flower-stalks much lengthened when in fruit. Flowers from May to August.

Very common in meadows and on rocks in the alps and lower alps, from about 3950 to 9050 ft. Especially frequent on soil rich in lime. Sometimes goes right down to the plains, as, for example, in the heathy and boggy meadows of the Bavarian Plateau (near Roith below Ratisbon and near Loiching below Landshut).

Pyrenees, Cevennes, Jura, Central and Eastern Alps; rare in Baden and the Carpathians.

Fig. 2. **Gentiána excísa** Koch (= *G. latifólia* Jak., = *G. Kóchiána* Perr. et Song.), *Keulen-Enzian.*

2–4 in. high. Very like the preceding species in size and habit, but distinguished from it by the following characteristics: Leaves broader, elliptic or oval, blunter and softer, broadest in the upper third, only rarely in the middle. Calyx-teeth standing away from the corolla, usually less than half as long as the calyx-tube, spatula-shaped, springing from a somewhat contracted base; hollow between the calyx-teeth, broad, the lobes being connected by a white membrane. Corolla azure-blue, rarely violet, white, or blue mottled with white, with olive-green spots inside. Flowers from June to August.

Fairly common in pastures and among boulders and debris, from about 5600 to 9850 ft. Scarcely found in Bavaria except in the Algäuer Alps. Prefers clayey, non-calcareous soil.

Pyrenees, Alps, Jura, Carpathians, Balkans. Especially frequent on primitive rocks.

The flowers, like those of the preceding species, are eagerly visited by bumble-bees seeking the honey which is found in five separate cells at the base of the flower.

The closely related *Gentiána alpina* Vill., found in the south-western parts of the Swiss Alps and in the Pyrenees, has smaller leaves and smaller, tube-shaped, almost sessile, flowers.

Fig. 3. **Gentiána vérna** L., *Frühlings-Enzian*, Spring Gentian.*

Stierenäugli, Steinägeli, Himmelsbläueli, Vaterunserli, Himmelsschlüsseli, Schuhmacherleni, Gröfli (Switzerland), Schusternägerl (Upper Bavaria), Schusterveigerl, Dintenblume, Saubleam'l, Schneiderle (Tirol), Guckernagerl, Rabennagerl (Styria), Himmelsveigerl (Upper Austria), Clev da tschel, Spazzachamins (Romansch-speaking Grisons).

A plant 2–5 in. high, with leafy non-flowering shoots and simple flower-stems. Leaves elliptic-lanceolate, pointed, with a distinct midrib; radical leaves considerably larger than the stem-leaves, forming a rosette. Edges of calyx with narrow wings (with prominent wings in the variety *angulósa* Bieb.). Corolla deep blue, rarely lilac, pink, or white, with 5 oval teeth, between each of which there is a white-lined, 2-cleft appendage forming a sort of "corona". Flowers from April to August.

Widely distributed in damp peaty meadows and pastures and on rocks in the alps and lower alps, up to about 10,800 ft., also frequent at the foot of the mountains and sometimes in the plains.

Widely distributed in Central and Southern Europe and in the Caucasus. In Germany it occurs locally as far north as Hesse and Thuringia, but is not found in the Black Forest or the Vosges.

Fig. 4. **Gentiána brachyphýlla** Vill., *Kurzblätteriger Enzian.*

A small plant 1·2·5 in. high, with densely-leaved barren shoots and short flowering stems, the latter only rising a little way above the rosette of leaves. Leaves rounded, egg-shaped, tapering abruptly, closely overlapping each other, broadest in the middle. Calyx very slender. Edges of calyx with very narrow wings or none at all. Corolla deep blue; corolla tube slender. Flowers in July and August.

In grassy and stony places in the high alps, from 5900 to 13,800 ft. in the neighbourhood of eternal snow.

Pyrenees, Alps (Dauphiny to Styria), Siebenbürgen. Especially frequent on primitive rocks and schists.

Fig. 5. **Gentiána ramósa** Hegetschw., *Büschel-Enzian.*

·5–6 in. high. Stem bearing 3–7 pairs of leaves, simple, or dividing, usually above the base, into erect lateral branches. Radical leaves spatula-shaped, rounded at the extremity; intermediate and upper leaves egg-shaped or eggshaped-lanceolate, the bracts alone being pointed. Flowers pale lilac or whitish, short-stalked, with their parts in fives. Calyx-teeth bare at the edge, not recurved, distinctly longer than the calyx-tube; hollow between the calyx-teeth rounded, not pointed. Flowers from July to September.

On alpine pastures, from 5600 to 10,150 ft. Especially frequent on primitive rocks. Switzerland, Piedmont, Eastern Tirol.

The Field Gentian * (*Gentiána campéstris* L., *Feld-Enzian*), which is widely distributed in the alps and lower alps, may easily be distinguished from the above species by the fact that the parts of the flower occur in fours. Of the four calyx-teeth, the two outer ones are much broader than the two inner ones and cover most of the latter. *G. compacta* belongs to the group of many forms, *Gentiána Germánica* Willd., German Gentian * (a variety of *G. Amarella* L., Autumn Gentian), which has the parts of its flowers in fives.

Fig. 6. **Gentiána nána** Wulf., *Zwerg-Enzian.*

·8–2 in. high. Stem simple, or branching at the base into several short delicate curved ascending stems, bearing solitary flowers. Leaves inversely egg-shaped, blunt, rounded at the tip. Sepals 5, less frequently 4, fairly equal in size, egg-shaped. Corolla violet or whitish, tube-shaped to bell-shaped, with the inner side of the tube covered with small scales. Flowers from July to September.

Rare; found in stony grassy places, on moraines, and in cushions of moss, from about 7200 to 9200 ft.

Eastern chain of the Alps (Tirol, Salzburg, Carinthia).

Fig. 7. **Gentiána tenélla** Rottb., *Zarter Enzian.*

A delicate little annual plant, 1·6–6 in. high. Stem much branched all the way up, with long, ascending branches, each of which usually bears one flower. Leaves oblong-elliptic. Calyx bell-shaped, spreading, deeply 4-cleft (nearly to the bottom). Corolla dingy violet, rarely white, tube-shaped to bell-shaped, with four somewhat spreading teeth; inside of tube fringed with small scales. Flowers from July to September.

Rather uncommon; found on damp stretches of grass and pastures in the higher alps, from about 5600 to 9850 ft. Very rare in Bavaria; not found in Upper or Lower Austria.

Pyrenees, Alps, Carpathians, Siebenbürgen, Arctic Europe, North-western Siberia.

Fig. 8. **Gentiána nivális** L., *Schnee-Enzian*, Small Gentian *.

Himmelstengel, Kelberschis, Kölbaschis, Vergissmeinnid (Lower Austria), Schneebitterwurz (Vaud).

A delicate and extremely graceful annual plant, 1–6 in. high, with no barren shoots. Stem erect, usually branching all the way up. Radical leaves small and blunt, forming a loose rosette. Flowers on all branches terminal, dark azure blue, with a beautiful lustre. Corolla with 5 shortly tapering and somewhat spreading teeth. In dwarfed, stunted specimens the stem is sometimes unbranched, bearing only one minute flower. Flowers from June to August.

Common in meadows of short grass, in pastures, on alluvial deposits, and in light woods in the alps, from 5600 to 9850 ft. Found on limestone and primitive rocks.

Pyrenees, Alps, Apennines, Jura, Carpathians, Balkans, Asia Minor, Arctic Europe and North America.

The flowers of this extremely graceful gentian are very sensitive to sunlight. If a cloud passes over the sun the star-like blossoms suddenly close. This may happen several times within an hour. The seeds are extremely small and light, weighing only ·00015 gm. (·0023 grain), so that they are capable of flying through the air.

Fig. 9. **Gentiána frígida** Haenke, *Steirischer Enzian.*

·8–4 in. high. Leaves oblong-lanceolate, the lower ones crowded together, sessile, with membranous sheaths widening towards the top. Stem sometimes very short, bearing 1–2 (rarely 3) terminal flowers. Calyx erect, deeply cleft (to the middle). Calyx-teeth joined by a membrane at the base. Corolla club-shaped to bell-shaped, widening towards the top, ·8–1·4 in. long, with no scales inside the tube, yellowish-white with five bright blue streaks. Anthers distinct. Style very short, not projecting beyond the corolla. Seed with membranous edges. Flowers from July to September.

Stony pastures and rocks, from 6550 to 7950 ft. Found only in Styria, in the Niedere Tauern and the Eisenerzer Alpen; grows on primitive rocks.

Eastern Alps, Carpathians, Siebenbürgen.

Fig. 10. **Gentiána Bavárica** L., *Bayerischer Enzian.*

A small plant 1·5–8 in. high, forming small carpets, with fairly densely-leaved, rosette-like non-flowering shoots and simple ascending stems bearing solitary flowers. Leaves inversely egg-shaped, rounded, blunt, all the same size, or the lower ones smaller; the latter, moreover, are closely crowded together. In the variety *subacáulis* Schleicher (fig. 10*b*), all the leaves are so crowded together as to overlap each other. Corolla deep blue with a lighter-coloured tube and blunt teeth spreading out flat like a plate; tube without scales inside. Anthers yellow, distinct. Style deeply 2-cleft. Flowers from July to September.

Very common on pastures and in damp places in the alps, from about 5900 to 11,800 ft., less frequently as low as 4450 ft. The variety *subacáulis* Schl. is particularly frequent in the high alps between about 7850 and 11,800 ft.

Alps (Maritime Alps to Lower Austria), Abruzzi, Apennines.


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Gentianáceae. Gentian Order (*Continued*)

Fig. 1. **Gentiána purpúrea** L., *Purpurblütiger Enzian.*

Genzeni, Jenzeni, Gänzenen, Jänzenen, Rothenze, Spitzi Jänzeli (Switzerland), Genziana rossa (Ticino). In the Grisons the root is called Risch d'ansang.

8–24 in. high. Root sending up many shoots. Stems simple, erect. Leaves eggshaped-lanceolate, the lower ones long-stalked, the upper ones sessile. Lower whorls have only a few flowers, the upper ones 5–10 flowers. Flowers sessile, with no stalks. Calyx 2-cleft, sheath-like, slit up one side. Corolla bell-shaped, with 5–8 blunt teeth, with no hairs at the bottom, purplish-red outside, yellowish inside, rarely pure white or yellow. Anthers stuck together. Flowers from July to September.

Locally on moderately damp pastures, in hayfields, and in thickets of *Grün-Erle*; very common at the bottom of corries in the alps and lower alps, from about 4250 to 8850 ft. Savoy, Switzerland (especially in the outer chains of the Alps; scarcely ever found in the Central Alps), Vorarlberg, North-western Tirol (Rosanna, Paznaun, Fermont, Urgental, Venetjoch), Algäuer Alps.

Alps, Apennines, Apuane Alpi, Norway, Kamchatka.

Fig. 2. **Gentiána punctáta** L., *Punktierter Enzian.*

Verlachan (Bernese Oberland), Enznerwurz (Grisons), Edelwurz (Algäuer Alps), Zintalwurz (Salzburg), Ansanga, Giansauna puncteda (Romansch-speaking Grisons).

8–24 in. high. Stem simple, erect, with metallic streaks in the upper part. Leaves eggshaped-oblong, tapering, the lower ones stalked, the upper ones sessile. Flowers sessile. Lower whorls have only a few flowers, the upper many. Calyx bell-shaped, with 5–8 very unequal, erect, lanceolate teeth. Corolla bell-shaped, with a tube widening towards the top, dotted with bright yellow and black, with blunt oval segments. Anthers 5–6, finally distinct. In the one-coloured variety *cóncolor* Koch, the black dots are completely absent. Seed circular, flattened, with a membranous edge; ·08 in. wide. Flowers from July to September.

Fairly common in meadows and pastures, on screes, at the bottom of corries, in thickets and in coniferous woods of the alps and lower alps, from about 4600 to 10,000 ft. Found on limestone and primitive rocks. Not found in Carniola, Lower Austria, or Upper Austria.

Alps, summits of the Gesenke, Carpathians, Siebenbürgen, Balkans.

As in the preceding species, the honey is concealed in 5 separate nectaries between the bases of the stamens.

Fig. 3. **Gentiána Pannónica** Scop., *Brauner Enzian.*

Roter Enzian (Lower Austria, Styria), Hochwurz (Upper Austria), Stock- or Spitz-wurz (Upper Bavaria), Zintalwurz, Zinzallwurz, Vertaich (Lechtal), Weisse Enzianwurzel (Vorarlberg).

6–24 in. high. Stem simple, erect, with purplish-red streaks above. Lower leaves stalked, elliptic, upper ones not stalked, pointed, oblong-lanceolate. Flowers not stalked. Calyx erect, bell-shaped, with teeth bent outwards. Corolla bell-shaped, with rounded segments, dull or bluish-purple with reddish-black dots, rarely white. Anthers united. Flowers from the middle of July to September.

Locally in meadows and pastures (pastures of mat-weed, i.e. *Nardus stricta*), at the bottom of corries, and amongst mountain pine in the alps and lower alps from about 4250 to 7200 ft.

Eastern chain of the Alps (from the Churfirsten in Switzerland and the Bergamasque Alps to Lower Austria and Carniola), Bayerischerwald, Böhmerwald, Carpathians, Siebenbürgen.

Fig. 4. **Gentiána lútea** L., *Gelber Enzian.*

Spitz- or Stock-wurz (Upper Bavaria), Enzene, Jenstener, Wyss-Jenzä, Gelbe Jänzenen, Jenzerwurz, Grossi or Breiti Jänzelä, Branzwurza (Switzerland), Zintalwurz, Zinnzallwurz, Hochwurz (Tirol), Ansanga, Gigiansauna mela (Romansch-speaking Grisons), Gentiana maggiore, Genzianica (Ticino).

A handsome plant 2–5 ft. high, bare; like the three preceding species it has vigorous roots as thick as one's finger and as much as 3 ft. long. Stem simple, erect; may be as thick as one's finger. Leaves elliptic, bluish-green, traversed by strong curved veins; the lower ones short-stalked, the upper ones sessile. Flowers in apparent whorls of many (3–10) flowers at the end of the stem, and in the axils of the upper pairs of leaves, definitely stalked. Calyx membranous, pale yellow, slit longitudinally. Corolla wheel-shaped, cleft almost to the bottom into 5 or 6 (or occasionally even 9) segments, golden-yellow; segments finally spreading, almost like a star. Stamens distinct or (in the variety *symphyándra* Murbeck) united. Capsule pointed-globular, as much as 2·5 in. long. Seed with a distinct membranous wing. Flowers from July to August.

Fairly common and often gregarious in pastures and unmanured meadows, in thickets, on river-banks, in meadows and on damp heaths, from the foot of the mountains to the neighbourhood of the snow-line, from about 4600 to 7850 ft.; sometimes descending even lower (e.g. it is frequently found on the Bavarian Plateau). Prefers calcareous soil. Not found in Salzburg, Upper or Lower Austria.

Mountains of Spain, Pyrenees, Auvergne, Jura, Alps, Vosges, Black Forest, Schwäbische Alb, occasionally in Lower Franconia (Eussenheim near Karlstadt), formerly also in Thuringia, Karst, Croatia, Carpathians, Siebenbürgen, Apennines, Corsica, Sardinia, Balkans, Asia Minor.

The large powerful roots of various species of gentian provide the material for gentian brandy (*Enzianbitter*, also called *Jenzer* or *Enzeler*, and in Western Switzerland *eau-de-vie*). For this purpose the roots are crushed and then left to ferment. The necessary sugar is contained in the plant itself. In some localities this handsome plant has been completely exterminated by vandals digging it up. Gentian brandy is considered a never-failing panacea for various complaints, and especially when the stomach is " out of order ". The Tirolese say of it: " Wia die Enzianwurzel ist koani so stark " (nothing is so strong as gentian root). A decoction of the roots and leaves is used for gout, fever, and chlorosis, and in veterinary science for all kinds of digestive troubles. In the Wäggital (Canton Schwyz) the root is collected for foot-baths. In Styria the large leaves are laid as a cooling application on open wounds and inflamed parts. Gentian, eaten with cress and burnet saxifrage in springtime, is considered extremely good for purifying the blood. The bitter-tasting gentian herbage in pastures is always left untouched by cattle. When out of flower *Gentiána lútea* greatly resembles *Verátrum álbum* in its habit; the latter, however, has alternate leaves, covered with downy hairs on the under side. The honey secreted at the bottom of the ovary is easily accessible to a large number of visitors.

Interesting and beautifully-coloured hybrids sometimes occur between various species, e.g. between *Gentiana lutea* and *G. punctata* (= *G. Doerfléri* Ronn.), between *Gentiana lutea* and *G. purpurea* (= *G. hybrida* Schleich (*not* Vill.)), between *Gentiana punctata* and *G. purpurea* (= *G. spúria* Lebert), and between *Gentiana lutea* and *G. Pannonica* (= *G. Lángstii* Hausm.).


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Boraginaceae. Borage Order

Mostly perennial plants, usually covered with rough hairs. Leaves alternate, entire, without stipules. Inflorescence a coiled-up cyme. Flowers bisexual, with their parts in fives. Corolla with the petals united, usually regular. Corolla tube with or without hairs, sometimes more or less completely closed by 5 scales alternating with the stamens. Ovary superior, finally forming 4 small one-seeded nuts between which the style emerges.

This family has only a few representatives at the level of the alps.

Fig. 1. **Cerínthe alpína** Kit. (= *C. glábra* Mill.), *Alpen-Wachsblume.*

12–18 in. high. Stem erect, bare, fairly densely leaved. Leaves bare, bluish-grey, entire, inversely egg-shaped, tapering into the leaf-stalk; upper leaves oblong, rounded at the tip, half enclosing the stem; leaves grass-green above, bluish-green below. Inflorescence a helicoid cyme, leafy, lengthening later. Calyx-teeth bare, half as long as the corolla, egg-shaped, spreading or bent backwards. Corolla with 5 small egg-shaped teeth bent back at the tips; corolla-tube pale yellow, limb golden-yellow to greenish-yellow, with 5 purplish-red spots at the bottoms of the hollows between the teeth. Flowers in July and August.

Occasionally found on stony slopes and in meadows in the alps or lower alps, rising to 8700 ft.; often carried down a long way into the plains by alpine rivers, e.g. by the Iller as far as Ulm and by the Danube as far as Dillingen. Flourishes on calcareous subsoils.

Pyrenees, Alps, Jura, Carpathians, Apennines, Balkans, Asia Minor.

Fig. 2. **Myosótis alpéstris** Schmidt, *Alpen-Vergissmeinnicht*, Mountain Forget-me-not.*

Jochvergissmeinnicht (Tirol), Calamandrin, Non am sman-cher (Romansch-speaking Grisons).

2–4 in. high. Stem erect, with somewhat sharp edges, bearing short, fairly dense, scorpioid inflorescences, the latter, like the leaves, being covered with rough hairs. Calyx almost silver-white owing to its numerous appressed, slightly projecting hooked hairs. Corolla a beautiful sky-blue, rarely white, somewhat fragrant; the tube is somewhat narrowed by 5 deep yellow scales. Fruit-stalks not much longer than the calyx, fairly thick. Flowers in June and July.

Very common in meadows and pastures in the alps and high alps, from about 5250 to 9850 ft., very rarely descending lower (to 925 ft.).

Pyrenees, Auvergne, Alps, Vosges, Schwäbischer Jura, Carpathians, Caucasus, Corsica, northern and Arctic regions. The Mountain Forget-me-not is an alpine form of the Wood Forget-me-not * (*Myosótis silvática* Hoffm.), which is common in the plains and has crowded inflorescences and a brilliantly coloured corolla.

Fig. 3. **Eritrichium nánum** (All.) Schrad., *Zwerg-Himmelsherold.*

A small, low-growing plant ·8–2 in. high, with a shining silky appearance, forming a carpet. Stem much branched and densely leaved. Leaves lanceolate; radical leaves forming a close rosette. Inflorescence with 3–6 flowers. Flowers a beautiful bright blue, resembling those of the Forget-me-not. Small fruits surrounded

with a narrow membrane, with one or two teeth or fringed with prickles at the edge. Flowers in July and August.

Rather uncommon; found in clefts of rocks in the snow region, from 8200 to 11,850 ft. Found only on primitive rocks.

Alps (not found in Bavaria, Lower or Upper Austria), Altai Mountains, Siberia, Arctic regions.

Labiátae. Labiate Order

Stem almost always with four distinct edges. Leaves opposite, usually entire. Stipules wanting. Inflorescence usually consisting of apparent whorls of numerous flowers, either sessile in the axils of leaves or arranged in a head or spike at the end of the stem. Calyx with the sepals united, tube-shaped, persistent, with 5 teeth or 2 lips. Corolla usually with two distinct lips, the upper being divided into two segments and the lower into three. Stamens usually 4, rarely 2, the back ones usually being shorter than the others. Ovary superior, at first 2-celled, later divided by the formation of a false partition into 4 one-seeded cells, between which the long style emerges.

Fig. 4. **Ájuga pyramidális** L., *Pyramiden-Günsel*, Pyramidal Bugle.*

Blawellen, Braunellen, Melcherdötzen (Zillertal).

A plant 4–8 in. high, with a dense pyramidal habit, without runners. Stem erect, simple, usually hairy. Lower leaves arranged in a rosette, inversely egg-shaped, blunt or rounded, hairy, slightly crenate. Bracts large, egg-shaped, entire, almost twice as long as the flowers, streaked with red or purplish-red. Apparent whorls forming an apparent spike which sometimes begins right at the foot of the stalk. Flowers pale blue, rarely white. Flowers in July and August.

Locally on pastures, in woods, and amongst mountain pine in the alps and lower alps, ascending to about 7850 ft., sometimes found lower down. Especially frequent on clayey soil.

Pyrenees, Alps, occasionally in Central Germany and the mountains of France, Caucasus, Southern Scandinavia, Urals, Altai Mountains.

Fig. 5. **Hormínum Pyrenáicum** L., *Pyrenäen-Drachenmaul.*

4–10 in. high. Stem rising erectly from an oblique rootstock, simple. Radical leaves large, inversely egg-shaped, tapering into the leaf-stalk, crenate, green on both sides; stem-leaves smaller, pointed, with almost entire margins. Apparent whorls usually with 6 flowers, in terminal, almost one-sided apparent spikes. Calyx bell-shaped, bent downwards when in fruit, 2-lipped. Corolla a beautiful violet. Stamens 4, the lower ones being the longer. Flowers from June to August.

Occasionally found in stony meadows and among boulders in the alps, from 4600 to 7550 ft. (sometimes descending to 975 ft.). Found only on limestone.

Pyrenees, Central and Eastern Alps, but often quite unknown in great stretches of country. In Bavaria found as a rare plant in the alps surrounding the Königssee.

Fig. 6. **Scutellária alpína** L., *Alpen-Helmkraut.*

8–16 in. high. Stem prostrate, branched, hairy. Leaves stalked, egg-shaped or elliptic, blunt, green on both sides and somewhat hairy, crenate-toothed. Flowers in terminal four-sided apparent spikes, with entire membranous bracts. Apparent whorls with two flowers. Flowers stalked. Bracts entire. Corolla bluish-violet with a whitish lower lip. Flowers in July.

Stony places in the alps; found locally up to 7850 ft.

Pyrenees, Cevennes, Côte d'Or, Western Alps, Siebenbürgen, Urals, Altai Mountains. Not found in the Bavarian or Austrian Alps at all.

Fig. 7. **Calamíntha** (= *Saturéia*) **alpína** Lam., *Alpen-Kalaminthe.*

4–12 in. high. Stem ascending from an inclined rootstock, slightly hairy. Leaves egg-shaped, on very short stalks, bare or sparsely haired, serrate towards the tips. Corolla purplish-red, rarely white, considerably longer than the calyx. Calyx-teeth remaining open after the flower has faded. Flowers from June to August.

Common and widely distributed on stony slopes, on rocks, on heathy pastures and meadows beside streams in the alps and lower alps, from about 5600 ft. to about 7550 ft.; sometimes found in the plains also.

Pyrenees Alps, Carpathians, mountains of Northern Africa and the East.


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Scrophulariáceae. Foxglove Order

This order is very closely related to the Labiate Order, but the stem is not 4-edged. Leaves without stipules, usually opposite, rarely, as e.g. in *Erinus*, alternate. Corolla usually distinctly 2-lipped and bilaterally symmetrical. Stamens inserted into the corolla, usually four in number (two longer and two shorter), less frequently two (*Verónica*) or five (*Verbáscum*). Ovary superior, almost always 2-celled. Fruit a capsule bursting open with 2 valves, with numerous small seeds.

Fig. 1. **Linária alpína** Mill., *Alpen-Leinkraut.*

Lebngescherl, Löwenmaul (Lower Austria), Tausendschön, Blaue Johannisblüeh (Upper Austria), Immernicht, Steinkliter (Carinthia), Verschreikraut (Salzburg, Tirol).

A small bare plant 2–6 in. high, one of the few annuals or biennials among alpine plants. Stem divided just above the ground into numerous prostrate or ascending branches. Leaves in whorls of 3–4, small, linear-oblong, tapering towards the base, thick, bluish-green. Flowers in a short compact raceme, always terminal. Calyx lanceolate, pointed, shorter than the fruit. Corolla bluish-violet, with a long spur in which honey is concealed, and a saffron-yellow or brick-red spot on the palate which is thought to show insects the way to the honey; less frequently bluish-violet all over (var. *cóncolor* Hausm.) or quite yellow (var. *fláva* Gremli). Flowers from June to September.

Very common among boulders and rocky debris in the alps, ascending to 13,900 ft.; often carried down by rivers a long way into the plains, by the Isar to below Munich, by the Iller to Ulm and Dillingen, by the Rhine to Basel, by the Inn to Rosenheim; found beside the Enns near Steyr, the Ybbs down to Ulmerfeld, and on the banks of the Lake of Constance near Rheineck, Wasserburg, &c. Found on limestone and primitive rocks.

Mountains of Spain, Pyrenees, Jura, Alps, Balkans.

Fig. 2. **Erínus alpínus** L., *Alpen-Leberbalsam.*

4–8 in. high, forming a carpet. Stems emerging several at a time from the dense rosettes of radical leaves. Leaves alternate, spatula-shaped, bare, crenate at the extremity, gradually tapering into the short leaf-stalk. Inflorescence at first umbellate, later forming an extended raceme. Flower-stalk about the same length as the calyx. Corolla reddish-violet, salver-shaped, with 5 notched teeth. Stamens 4. Stigma with a wing-like tooth on either side. Fruit bursting open with 2 valves, with numerous small egg-shaped seeds; valves of fruit finally splitting in two. Flowers from April to June.

Locally in clefts of rocks and on debris in the limestone alps, from about 4900 to 7700 ft., descending to 1550 ft. by the Lake of Lucerne and to 1180 ft. by the Lake of Geneva.

Pyrenees, Western and Central Alps, Jura. Not found in Bavaria or Austria at all.

Fig. 3. **Verónica fruticulósa** L., *Strauchiger Ehrenpreis.*

A subshrub 4–12 in. high, gracefully branching, with erect flowering and non-flowering shoots. Lowest leaves oval, those on the stem opposite, oblong, blunt, slightly crenate, larger than the lower ones, covered like the stem with appressed hairs. Inflorescence terminal, covered with downy glandular hairs, with fairly few flowers. Corolla light red with dark veins, readily falling off. Fruit oval with a shallow notch, covered, like the calyx, with fine glandular hairs. Flowers in July and August.

Not very common; found in stony meadows, on sunny rock-faces, and among debris in the alps and lower alps, up to about 8850 ft. Especially frequent on limestone. In Bavaria found only in the Algäuer Alps (Grünten and Ochsenalpe in the Bärgündele).

Sierra Nevada, Pyrenees, Jura, Alps, Corsica.

Fig. 4. **Verónica alpína** L., *Alpen-Ehrenpreis*, Alpine Veronica.*

Ebenauskräutl (Lower Austria).

·8–6 in. high. Rootstock sending out several ascending herbaceous stems covered with projecting hairs. Lower leaves smaller than the upper ones, rounded-eggshaped, blunt; all the leaves hairy, crenate or entire. Inflorescence terminal, short, compact, with a few flowers, rough with projecting, jointed, non-glandular hairs. Flowers small, blue. Fruit-capsule oblong-inversely-eggshaped, ·2–·3 in. long, covered with long hairs, notched. Style at most half as long as the fruit-capsule. Flowers from June to August.

Fairly common on grassy slopes and stony meadows in the alps, from about 4900 to 10,500 ft. Found on limestone and primitive rocks.

Pyrenees, Auvergne, Jura, Alps, Riesengebirge, Carpathians, Abruzzi, Arctic regions.

Fig. 5. **Verónica frúticans** Jacq. (= *V. saxátilis* Scop.), *Felsen-Ehrenpreis*, Rock Speedwell.*

2–6 in. high. Stem branching all the way up, almost woody; branches ascending. Leaves oblong or elliptic, somewhat crenate, almost bare; the lower ones smaller. Inflorescence terminal, with a few flowers, somewhat downy with curled non-glandular hairs. Corolla a beautiful azure-blue, with a dark purplish-red ring in the tube, rarely red. Fruit egg-shaped, tapering upwards, scarcely notched, longer than the calyx, without glandular hairs. Flowers from June to August.

Fairly common on rocky slopes, stony places, and dry, arid pastures in the alps, from 3950 to 9200 ft., sometimes descending a long way (to 975 ft.). Especially frequent on primitive rocks.

Pyrenees, Alps, Vosges, Black Forest (Feldberg, Belchen), Corsica, Carpathians, Siebenbürgen, Western Balkans, Scotland, Arctic regions, Altai Mountains.

Fig. 6. **Verónica aphýlla** L., *Blattloser Ehrenpreis.*

A dainty little plant 1–3 in. high, sending out thin runners. Stem ascending, slender. Leaves one above the other, almost forming a rosette, nearly sessile, oblong-inversely-egg-shaped, crenate, serrate, or entire, sparsely haired. Inflorescence fairly long-stalked, with but few (3–5) flowers, springing from the axil of the highest leaf and hence apparently terminal. Corolla wheel-shaped, of an intense blue colour with darker streaks. Stamens 2, as in all species of *Veronica*. Fruit-stalk erect, longer than the large, inversely heart-shaped fruit, which is covered with glandular hairs. Flowers from June to August.

Common in stony places, meadows, and clefts of rock full of humus in the alps and lower alps, from 3950 to 9200 ft.; also on the higher summits in the Swiss Jura. Found on limestone.

Pyrenees, Alps, Jura, Apennines, Balkans, Carpathians, Caucasus, North America, Altai Mountains.

Fig. 7. **Verónica bellidioídes** L., *Massliebchen-Ehrenpreis.*

2–8 in. high. Stem erect, covered with rough hairs like the leaves. Leaves inversely egg-shaped, blunt, slightly crenate or almost entire; the lower ones larger and closer together, almost crowded into a rosette, narrowing into their short stems, the upper ones sessile, usually opposite. Inflorescence terminal, shaggy, with jointed hairs. Sepals 4, densely haired. Corolla spreading like a wheel, dull blue, with a short tube. Fruit inversely egg-shaped, not deeply notched, covered with glandular hairs. Flowers from June to August.

Fairly common in pastures and meadows rich in humus, in the alps and lower alps, from about 5900 to 10,150 ft. Especially frequent on primitive rocks.

Pyrenees, Alps, Gesenke, Carpathians, Siebenbürgen, North-western Balkans.

The various species of *Veronica* are chiefly fertilized by flies, but also by bees and beetles.

Fig. 8. **Paederóta Bonaróta** L., *Blaues Mänderlein.*

In Carinthia the plant is called *das blaue Menderle* (manikin); this is merely a popular interpretation of *Blaues Hamenderlei* (a diminutive of *Gamander* (germander)).

3–6 in. high. Stem erect, not much branched, and like the whole plant covered with short bristly hairs. Leaves egg-shaped or almost circular, short-stalked; the lower ones almost rounded at the tip, with sharply serrate margins. Flowers in a short terminal raceme; the lower ones on fairly long stalks, the upper ones on shorter stalks. Bracts narrow, linear, pointed, purplish-red, like the sepals. Corolla funnel-shaped, 2-lipped, with an entire or 2-cleft upper lip and a 2-lobed lower lip. Stamens 2, longer than the corolla. Style likewise projecting a long way from the corolla. Capsule globular, tapering. Flowers from June to August.

Occasionally found in clefts of rocks in the southern limestone alps, from the bottom of the valleys to 8200 ft. From Lombardy and Southern Tirol to Carniola; not found in Switzerland or Bavaria at all, or in the Karawanken and Sanntal Alps.

In the closely related yellow-flowered *Paederóta Agéria* L. the stamens do not project beyond the corolla.

Fig. 9. **Euphrásia mínima** Jacq., *Kleinster Augentrost*, Dwarf Eye-bright *.

A graceful little annual plant, ·2–1 in. high, bare or covered with short hairs. Stem erect or branching all the way up. Stem-leaves always blunt, crenate, sessile, with two or three bristle-less teeth on either side. Leaves and bracts bristly with hairs, at least along the margins and veins. Corolla small; tube enclosed in the 4-cleft calyx; lower lip 3-cleft, with notched segments. Colour of flowers very variable; corolla quite yellow or white with a bluish-violet upper lip and a yellow lower lip. Flowers in July and August.

Common in meadows and pastures of the alps, from about 3950 to 10,800 ft.

Pyrenees, Alps, Vosges, Riesengebirge, at Blankenberg near Gera, Carpathians, Siebenbürgen, Apennines, Balkans, Northern Europe.

This inconspicuous little plant is a sure indicator of poor soil. Besides this species, various species are found in the Alps which are very like it and not very easily distinguished from each other.


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Scrophulariáceae. Foxglove Order (*Continued*)

Fig. 1. **Pediculáris verticillata** L., *Quirlblättriges Läusekraut*, Whorled Lousewort.

2–12 in. high. Stems usually two or more, unbranched, hairy. Leaves deeply pinnatifid, in whorls of 3 or 4 round the stem. Flowers in a head-like spike. Calyx inflated, covered with grey hairs, cleft at the top. Corolla purplish-red, very rarely white; upper lip almost straight, not beaked, bare. Flowers from June to August.

Common in stony meadows and pastures in the alps, from about 4600 to 9200 ft.

Sierra Nevada, Pyrenees, Auvergne, Alps, Apennines, Carpathians, Siebenbürgen, Balkans, northern and Arctic regions.

This semi-parasitic plant shows a marked preference for grasses. A favourite habitat is a slope of Blue Moor Grass * (*Sesléria caerúlea*, *Blaugras*).

Fig. 2. **Pediculáris foliósa** L., *Gelbes Läusekraut.*

Gälbstirzel, Geissfarä (Switzerland).

A handsome, conspicuous plant 6–20 in. high, with a distinctive habit. The flower-spikes are interspersed with large, long, pinnate bracts. Radical leaves long-stalked, twice pinnate, with sharply toothed prickly segments. Calyx short, bell-shaped, with 5 teeth, the joints shaggy with hairs; the tooth at the back longer than the others. Corolla a pale sulphur yellow, as much as an inch long; upper lip almost straight, not toothed, downy outside. All the stamens densely fringed at the tip. Capsule egg-shaped, short, with a short spine. Flowers from June to August.

Fairly common in meadows, on heaps of debris overgrown by grass, on shady precipices, and among mountain pine in the alps, from 4900 to 7850 ft., occasionally lower (to 2625 ft.).

Pyrenees, Alps, Jura, summits of the Vosges, Schwäbische Alb (on the Hunsrück and Blasenberg), Apennines. A limestone plant.

All the species of *Pediculáris* are semi-parasites, with suckers developed on their roots, which they bring into contact with roots of other plants. They are driven away by manuring, and in spite of their showily-coloured flowers are to be regarded as weeds.

Fig. 3. **Bártsia alpína** L., *Alpen-Helm*, Alpine Bartsia.*

Ross-Stengel (Switzerland), Frauentreu.

2–8 in. high. Leaves opposite, each pair standing at right angles to the next, egg-shaped, blunt, crenate-serrate, sessile, half clasping the stem; all the leaves, or at least the upper ones, coloured bright violet to coppery-red. Flowers terminal, in a short, almost head-like spike, with large bracts, short-stalked. Calyx tube- to bell-shaped, fringed. Corolla tube-shaped, widening upwards like a funnel, dark violet, very rarely yellow; upper lip helmet-shaped, entire, lower lip flat. Anthers downy with hairs, projecting only a little way beyond the corolla-tube. Capsule 2-celled, hairy. Seed winged, with longitudinal ridges. Flowers from May to August.

Very common in meadows and pastures, and in boggy meadows in the alps and lower alps, from about 4600 to 8850 ft.; not uncommonly descending even to the plains.

Pyrenees, Jura, Alps, Vosges, Black Forest (Feldberg), Riesengebirge, Gesenke, Carpathians, northern and Arctic regions. Found on limestone and primitive rocks.

In St. Antönien (Grisons) the plant is pulverized and used as a remedy for abscesses. This plant is also a semi-parasite and is chiefly fertilized by bumble-bees.

Globulariáceae.

Subshrubs or herbs with alternate, entire leaves. Stipules wanting. Flowers with bilateral symmetry, united to form a head. Calyx tube-shaped, 2-lipped. Corolla with the petals united, 2-lipped, with 5 narrow teeth, of which the two shorter ones form the upper lip and the three longer ones the lower lip. Stamens 4, inserted into the corolla tube, projecting a long way beyond the corolla. Ovary superior, one-celled. Fruit a one-seeded nut, enclosed in the persistent calyx.

The plants belonging to this order are chiefly natives of Mediterranean regions. The two following species are the only ones which occur in the Alps.

Fig. 4. **Globulária cordifólia** L., *Herzblätterige Kugelblume.*

A small, branching, prostrate shrub, 1–6 in. high, forming a carpet, much branched above ground owing to the formation of creeping shoots which become woody and throw out roots. Radical leaves inversely egg-shaped, tapering towards the base, very blunt and with a heart-shaped notch at the extremity, stiff and leathery. Stem erect, leafless or with 1–2 scale-like bracts, bearing the dense globular flower-head at its extremity. Flowers a light bluish-lilac, very rarely white. Flowers from May to August.

Very common on poor stony pastures and on sunny cliffs in the alps and lower alps, up to 8550 ft.; often descending even to the plains (in Bavaria found as far north as Munich and Landshut); in Southern Europe found on limestone heaths (*Karstheiden*).

Pyrenees, Alps, Carpathians, Apennines, Balkans. A limestone plant fertilized by butterflies.

Fig. 5. **Globulária nudicaúlis** L., *Nacktstengelige Kugelblume.*

4–12 in. high. Rootstock throwing up many shoots. Stem unbranched above ground. Radical leaves nearly as long as the flower-stalk, bare, leathery, wedge-shaped, gradually tapering into the leaf-stalk, entire, rounded or truncate at the tip. Stem almost leafless, with only 1–3 small scale-like leaves, bearing at its extremity the large flower-head, which is ·7–1 in. across. Corolla bluish-lilac, rarely white; upper lip atrophied. Flowers from May to August.

Very common among mountain pine, in meadows and on rocky debris in the alps and lower alps, from 2600 to 8650 ft., sometimes descending to the bottoms of the valleys.

Mountains of Spain, Pyrenees, Alps, Apennines. A limestone plant fertilized by butterflies.

Plantagináceae. Plantain Order

Leaves usually entire, without stipules. Flowers forming a spike or head. Flowers regular, with a 4-cleft persistent calyx, a leathery corolla with the petals united and 4 straight teeth, and 4 stamens which are bent inwards in the bud and later project from the corolla. Ovary superior, usually 2-celled, with a long thread-like style. Fruit a capsule with a lid that bursts open.

Fig. 6. **Plantágo alpína** L., *Alpen-Wegetritt*, Mew-wort.

Nadelgras, Adelgras, Ritz, Romeye (Switzerland), Rütz, Rätz (Algäuer Alps, Vorarlberg), Plantaja riz (Romansch-speaking Grisons), Coronopo, Erba stella (Ticino).

·8–8 in. high. Rootstock vigorous, throwing out many shoots. Leaves all springing from the root, forming a rosette, lanceolate-linear, somewhat fleshy, ·1–·3 in. broad, usually 3-nerved, entire or slightly toothed, tapering in both directions. Flower-stalk tapering, cylindrical, standing up stiffly. Inflorescence oblong-cylindrical, in high alpine situations sometimes almost globular. Corolla-tube downy with hairs. Capsule ·1 in. long, egg-shaped, blunt, with 2–10 seeds. Flowers from May to July.

Very common in rich stony meadows and pastures on deep soil in the alps and lower alps, from about 4900 to 8850 ft., occasionally descending to 3275 ft.

Pyrenees, Auvergne, Jura, Alps. In Bavaria in the Algäuer Alps only; not found in Lower Austria, Upper Austria, Styria, Carinthia, or Carniola. A wind-fertilized plant, which makes excellent fodder.

Caprifoliáceae. Honeysuckle Order

Leaves usually opposite. Flowers as a rule with their parts in fives. Stamens usually 5, inserted into the corolla-tube. Ovary inferior, 2–5-celled. Fruit a berry or drupe with one or more stones. Most members of this order are shrubs or trees. They are only very sparingly represented in alpine regions.

Fig. 7. **Lonicéra caerúlea** L., *Blaue Zweikirsche.*

Totenbeere (Carinthia), Totenbeer (Carinthia, Tirol), Teissa blo, Lonicéra blova, Bravroler (Romansch-speaking Grisons).

A branching shrub 16–32 in. high, with yellow or coral-red bark full of cracks; the leafy shoots have 2–3 pointed buds above each leaf, one just above and at right angles to the other. Leaves opposite, short-stalked, oblong-elliptic, blunt, with scattered hairs, bluish-green below. Flowers yellowish-white, bell-shaped, growing in pairs on a common stem in the axils of the leaves, covered with fine hairs. Flower-stalks shorter than the flowers. Calyx soon falling off. Stamens 5, projecting like the undivided style from the corolla, which is almost regular. Ovaries completely united with each other, forming an elliptic, many-seeded, bluish-black berry, which is covered with bloom. Flowers from May to July.

Fairly common in woods, thickets, and bogs, and on stony slopes in the alps and lower alps, up to 8625 ft., occasionally descending lower.

Pyrenees, Alps, Jura, Upper Swabia, Bayerischer Wald (Riesloch near Bodenmais), Carpathians, Balkans, northern regions; not found in Lower Austria. Especially frequent on limestone.

Fig. 8. **Linnæa boreális** L., *Nordisches Moosglöckchen*, Linnaea.*

A graceful, creeping little subshrub, with thin, woody, delicate, threadlike stems which creep through the cushions of moss in alpine forests. Stem as much as 6 in. high, erect, bearing 1, 2, or less frequently 3 or 4 flowers. Flower-stems covered with glandular hairs. Leaves opposite, short-stalked, almost circular, crenate-serrate at the tip, almost leathery, light-green below. Flowers long-stalked, with two small bracts. Calyx tube-shaped with 5 narrow, deciduous teeth. Corolla funnel- to bell-shaped, somewhat unevenly 5-lobed, pale reddish-pink outside, with dark veins inside, with a delicious scent of vanilla (especially at night). Stamens 4, the two under ones longer. Ovary 3-celled, hairy. Fruit very seldom formed, a one-celled, not very juicy berry (hooked fruit) enclosed in the bracts, which are very sticky (it is distributed by clinging to animals). Flowers in July and August.

Locally in damp and mossy coniferous forests. Common in the Alps (in Bavaria very occasionally found in the Algäuer Alps), in the Iser- and Riesengebirge, not uncommon in Northern Germany (from East Prussia to Oldenburg), widely distributed in Northern Europe and North America.


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Valerianáceae. Valerian Order

Herbs or subshrubs with opposite entire or pinnatifid leaves. Stipules wanting. Inflorescence usually a cymose panicle, the branches ending in helicoid cymes. Flowers usually small, irregular, generally with their parts in fives. Calyx often very rudimentary, finally developing as in the *Compósitae* into a many-rayed pappus, i.e. into a flying mechanism for the fruits. Corolla tube-shaped or funnel-shaped, with 5 teeth, sometimes furnished with a spur. Stamens as a rule 3. Ovary inferior, one-celled, with a style. Fruit nut-like, one-seeded.

Fig. 1. **Valeriána supína** L., *Zwerg-Baldrian.*

1–6 in. high. Rootstock sending up many shoots, creeping, branching. Stem with a few leaves, and a terminal, fairly dense, head-like inflorescence surrounded by bracts. Leaves spatula-shaped, fringed, entire or somewhat toothed, stalked, with the exception of the uppermost pair of leaves, which are lanceolate and sessile. Flowers a pale reddish-lilac. Fruits bare, with a comparatively large pappus. Flowers in July and August.

Occasionally found on the summits of rocks, in "snowy valleys", and amongst boulders in the highest alps, from about 5900 to 8850 ft. Not found in Upper or Lower Austria. A limestone plant.

Eastern Alps (from the Eastern Grisons and Northern Italy to Styria and Carinthia).

Fig. 2. **Valeriána saxátilis,** L., *Felsen-Baldrian, Wilder Speik.*

2–12 in. high. Rootstock tufted with fibres. Stem erect, leafless, except for one pair of leaves in the middle. Leaves mostly springing from the root, entire or slightly toothed, 3–5-veined, fringed, long-stalked; stem-leaves linear-lanceolate. Cymes with only a few flowers, terminal or axillary. Corolla white. Fruit ·1 in. long, with a pappus. Flowers from June to August.

Fairly common on rocks and amongst boulders in the limestone alps, from about 3600 to 8200 ft.

Eastern Alps (from Central Switzerland and Northern Italy eastwards), Carpathians, Siebenbürgen, North-western Balkans. Only on calcareous subsoils.

For other species see Plate 32, figs. 1, 2, and 3.

Dipsacáceae. Scabious Order

Herbs with opposite leaves, without stipules. Flowers united to form a head surrounded by a very large number of bracts. Bracts of individual flowers sometimes developed into chaffy scales. Flowers bisexual. Calyx with bristle-shaped teeth or reduced to a narrow border. Corolla with the petals united, with bilateral symmetry; marginal florets sometimes regular. Stamens 4, inserted into the corolla-tube. Ovary inferior, enclosed in a membranous outer calyx (formed by bracts). Fruit a dry, one-seeded nut, crowned by the calyx.

Fig. 3. **Scabiósa lúcida** Vill., *Glänzender Taubenkopf.*

4–12 in. high, almost hairless. Lowest leaves and those of the non-flowering shoots stalked, oblong, crenate, tapering into the leaf-stalk; the upper leaves pinnatifid, with lanceolate-linear entire or serrate tips. Heads ·8–1·6 in. across. Bracts lanceolate. Corolla reddish-lilac. Bristles of the calyx three or four times as long as the margin of the outer calyx. Flowers in July and August.

Common in meadows and pastures and on rocks in the alps and lower alps, from about 4600 to 8200 ft.

Pyrenees, Alps, Jura, Vosges, Riesengebirge, Gesenke, Carpathians. Especially frequent on limestone.

Campanuláceae. Bell-flower Order

Leaves alternate, usually entire. Stipules wanting. Flowers bisexual, regular, forming spiked, racemose, panicled or head-like inflorescences, less frequently solitary. Calyx of 5 segments, more or less deeply cleft. Corolla with the petals united, tube-, bell- or wheel-shaped. Stamens 5, usually expanded at the base, forming honey-secreting surfaces covering the ovary. Ovary inferior, usually 3-celled. Style with a thread-like stigma, which is often lobed or knobbed; upper part of style covered with hairs (stylar brush, collecting hairs), to which the pollen from the anthers adheres. Fruit a many-seeded capsule, usually bursting open so as to form holes.

Fig. 4. **Campánula barbáta** L., *Bärtige Glockenblume.*

4–16 in. high. Stem simple, covered with stiff hairs, bearing leaves at wide intervals, and a racemose or panicled inflorescence, usually one-sided. Radical leaves oblong-lanceolate, almost entire, tapering into the leaf-stalk. Calyx shaggy with hairs, usually with reflexed appendages in the hollows between the calyx-teeth. Corolla ·6–1·2 in. long, bell-shaped, fringed along the margins of the teeth, pale blue, sometimes milk-white, very rarely reddish-brown. Stigmas 3. Flowers from June to August.

Fairly common in meadows and pastures, on heaths, and among mountain pine in the alps, from about 4900 to 9200 ft. Especially frequent on non-calcareous soils or soils rich in humus.—Alps, Schneeberg near Glatz, Carpathians, Norway.

Fig. 5. **Campánula Scheuchzéri** Vill., *Scheuchzer's Glockenblume.*

4–16 in. high, forming loose carpets. Radical leaves inversely egg-shaped to lanceolate, entire or slightly crenate; stem-leaves linear, sessile, gradually narrowing upwards. Stem with 1–6 flowers. Flowers stalked, erect or somewhat nodding, of a wide bell shape, ·7–1 in. long, dark bluish-violet. Calyx-teeth erect, less frequently somewhat spreading. Flowers from July to September.

Very common in meadows, on stony ground, and on rocks in the alps and lower alps, from about 4600 to 10,150 ft.; sometimes descending even lower (to 1300 ft.). A schist-loving plant.

Pyrenees, Alps, Jura, Black Forest, Böhmerwald, Riesengebirge, Gesenke, Carpathians, Apennines, Arctic regions, Altai Mountains.

Fig. 6. **Campánula pusílla** Haenke (= *C. cochleariifólia* Lam.), *Zierliche Glockenblume.*

Steiglöggli, Murälöggli (Switzerland).

A bare or hairy plant 2–8 in. high, usually forming large and fairly dense carpets. Lower leaves numerous, egg-shaped, truncate or slightly heart- or kidney-shaped at the base, coarsely toothed and definitely stalked; upper leaves linear, toothed, and sessile. Stem ascending, bearing a one-sided raceme (often resembling a panicle) of a few flowers, or frequently a solitary flower. Calyx-teeth erect or spreading. Corolla nodding, bell-shaped, blue, occasionally milk-white. Flowers from June to September.

Very common on rocks and stony slopes and among boulders and river gravel in the alps, up to 9850 ft.; carried down by rivers into the valleys and often a long way into the surrounding lowlands, to below Basel, Ulm, Dillingen, Simbach, Landshut, and Lake Garda.

Pyrenees, Jura, Alb, Alps, Vosges, Black Forest (Feldberg, Bad Boll), Karst, Carpathians.

Fig. 7. **Phyteúma hemisphæricum** L., *Halbkugeliger Rapunzel.*

Zwangskräutl (Austria), Frauenspeik (Carinthia).

Rarely more than 1·5–4 in. high. Stem slender, with only one or two leaves. Leaves grass-like, springing from the root. Inflorescence forming a head, with an involucre of tapering, egg-shaped, fringed bracts below. Flowers 10–12 together in an almost globular head, dark bluish-violet, very rarely white. Corolla tube-shaped before opening, later splitting from below upwards into 5 teeth, which remain joined together at the tip. Stamens 5, broadening at the base. Style with 3 stigmas. Flowers in July and August.

In stony meadows and poor pastures, and on screes, debris, and accumulations of humus in the alps, from about 5600 to 11,800 ft.

Pyrenees, Alps (Maritime Alps to Salzburg and Styria), Apennines, Siebenbürgen. Especially frequent on primitive rocks and schists.

Fig. 8. **Phyteúma** (= *Synótoma*) **comósum** L., *Teufelskralle.*

2–6 in. high. Stem ascending, with leaves at intervals. Leaves stalked, unequally serrate; radical leaves on very long stalks and kidney-shaped, stem-leaves inversely egg-shaped to oblong-lanceolate. Flowers in a simple, loose, terminal, head-like umbel, as much as 1 in. long, azure-blue, purplish-black at the tips. Base of umbel enclosed in an involucre of large, leaf-like, oblong-lanceolate, toothed bracts. Stigmas 2. Capsule usually 2-celled. Flowers in June and July.

Rare; found in clefts of rocks in the southern limestone alps, from the bottom of the valleys up to 6550 ft.—Only in Southern Tirol, Carinthia, and Northern Italy.

For other species see Plate 32, figs. 4, 5, 6, 7, 8, and 9, and Plate 36, figs. 1, 2, and 3.


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Compósitae. Composite Order

Leaves usually alternate, less frequently opposite, without stipules, but sometimes with ear-like appendages at the base. Flowers bisexual, unisexual, or neuter, small, in heads of many at a time; flower-head enclosed in a common involucre, sometimes double, of numerous bracts which are often grown together. Bracts of the individual flowers occasionally developed into chaffy scales. Calyx often replaced by hairs, bristles, or scales, forming a " pappus " which later serves as a parachute for the fruits. Corolla with the petals united, with its parts in fours or fives, tubular or strap-shaped. Stamens 5, inserted into the corolla-tube; stamens adhering laterally to one another, forming a tube surrounding the double style. Style with a stylar brush which collects the pollen from the tube of stamens. Ovary inferior. Fruit a one-seeded nut.

For further species see Plate 32, figs. 10 and 11, Plate 37, and Plate 38.

Fig. 1. **Adenostýles alpína** Bluff et Fing. (— *A. glábra* DC.), *Kahler Alpen-Dost.*

Waldblern (Lower Austria), Falsches Rahmblotschel (Styria), Huafplotschen (Carinthia), Stoanpletsch'n, Goasskrapfl (Tirol), Schüsschrut, Schinderchrut, Wildä-Sarniggel (Switzerland), Scheissblattl (Upper Bavaria), Waldplacke (Baden), Mägdeheil (Hochgesenke).

12–31 in. high. Stem finely grooved, with leaves at intervals, downy with hairs above. Leaves kidney-shaped, stalked, fairly coarsely toothed, pale green below, bare, or with downy hairs on the veins only; usually without ear-like appendages at the base of the stalk. Heads of 3–4 flowers, united to form a terminal corymb. Flowers tubular, pale pink or reddish-lilac, rarely white. Styles projecting a long way from the florets. Flowers in July and August.

Very common in stony or wooded places in the alps and lower alps, from about 4900 to 8200 ft.; sometimes descending even lower, to 2450 ft.

This plant closely resembles the handsome *Adenostýles álbifrons* Rchb. (*Filziger Alpendost*) in its habit; in the latter species, however, the under side of the leaves is usually densely covered with woolly hairs so that it has a grey or white appearance. In addition, the leaf-stalks usually have ear-like appendages at the base.

Fig. 2. **Erígeron alpínus** L., *Alpen-Berufskraut*, Alpine Fleabane.*

Saubleaml (Lower Austria), Dürrwurzen (Upper Austria).

·8–8 in. high. Stem bearing 1–10 flower-heads, like the leaves more or less hairy, but without glandular hairs. Leaves blunt, lanceolate; the lower ones somewhat spatula-shaped, tapering into the leaf-stalk. The marginal strap-shaped florets are narrow, spreading, in several rows, purplish-violet, rarely whitish, twice as long as the inner disk florets, which are yellowish, tubular-threadlike, and female. Flowers from July to September.

Common in stony meadows and on rocks in the alps, from about 4900 to 9500 ft., sometimes descending lower (to 1425 ft.).

Pyrenees, Auvergne, Alps, Apennines, Carpathians, Caucasus, Mt. Parnassus, Northern Asia.

Besides this species, several other representatives of the genus are found in the Alps, but they are not very easy to distinguish from each other.

Fig. 3. **Áster alpínus** L., *Alpen-Aster*, *Sternblume.*

Blaue Gamsblüh (Tirol, Salzburg).

2–8 in. high. Stem as a rule bearing one flower-head, erect, covered with fine hairs. Leaves entire, covered with downy hairs, 3-veined; radical leaves oblong or spatula-shaped, tapering into the leaf-stalk; stem-leaves lanceolate and sessile. Flower-heads large, 1·25–1·75 in. across, with several rows of lanceolate bracts. Strap-shaped florets

in a single row, violet; disk-flowers tubular, golden-yellow. Fruits covered with projecting hairs. Flowers in July and August.

Locally in dry meadows, on sunny, stony slopes and screes in the Alps, from 4600 to 10,150 ft., often descending a long way (to 650 ft.). Also found in the Swiss Jura, occasionally in Thuringia (Upper Saaletal), in the Harz (Bodetal), Lausitzergebirge, Böhmische Mittelgebirge, Gesenke, and Altvater. Flourishes on limestone.

Fig. 4. **Leontopódium alpínum** Cass., *Edelweiss*.

Fodaweiss (Lower Austria), Chatzädoepli (Bernese Oberland, Vorarlberg), Irlweis, Bauchwehblüemle (Tirol), Hanetabbe (Algäuer Alps), Alv etern, Stail alpina (Romansch-speaking Grisons).

Rarely more than 2–4 in. high, very woolly, becoming bare when old. Stem erect, unbranched. Leaves tongue-shaped, lanceolate, thick with woolly hairs, especially on the under side. Flower-head (the so-called " flower ") terminal, with large white bracts forming a star, within which the 5–6 golden-yellow heads of numerous florets are placed. To a certain extent the bracts take the place of the strap-shaped ray florets and are thought to draw the attention of insects to the inconspicuous individual florets, which are all tubular, some being male, some female. Fruit ·05 in. long, with a pappus. Flowers from July to September.

On stretches of grass, rocks, amongst boulders, and in stony meadows in the alps, from about 5600 to 11,150 ft.; locally even lower. In many places it has been almost or entirely exterminated by people thoughtlessly uprooting it. Prefers limestone.

Alps, Jura, Carpathians, Abruzzi, Balkans, Pamirs, Afghanistan, Himalayas, Tibet, China, Japan.

The peasants of Tirol ascribe to the *Edelweiss* valuable medicinal properties, not only for the stomach and digestive organs, but also as a remedy for consumption. For this and other reasons the plant is greatly venerated.

Fig. 5. **Achilléa atráta** L., *Geschwärzte Schafgarbe*.

Frauenrauch (Lower Austria), Edelraute, Gemsraute (Upper Bavaria), Schwarze Gabüsse, Schwarze Garbe, Reifer, Genippkraut (Switzerland), Jochgramille, Grüner Raut (Tirol), Millefoglio, Erba Elva (Ticino).

4–10 in. high. Stem erect or ascending, covered with soft hairs. Leaves inversely oblong, simply pinnatifid, somewhat hairy, not dotted, with 2–3-cleft pointed segments. Radical leaves stalked; upper leaves sessile. Inflorescence a corymb of 3–12 flower-heads. Disk florets with chaffy scales. Bracts with a black margin. Flowers in July and August.

Fairly common on rocks, among boulders, and on stony slopes in the alps, from 5250 to 13,100 ft. Found on limestone only.—Alps, Carpathians.

See also *Achilléa moschata*, Plate 37, fig. 1.

Fig. 6. **Gnaphálium Norvégicum** Gunn., *Norweger Ruhrkraut*, Highland Cudweed.*

4–12 in. high. Stem simple, erect, with leaves at rather wide intervals. Leaves lanceolate, green above, with loose silky or woolly hairs, densely covered with down on the under side, 3-veined, gradually tapering into a short leaf-stalk. Middle stem-leaves very long, ·2–·8 in. broad. Flower-heads dark brown, forming a compact, almost simple, leafy spike. Outer bracts of involucre only a third as long as the flower-head. Flowers from July to September.

Occasionally found in alpine meadows and pinewoods, from about 4250 to 8850 ft.

Pyrenees, Auvergne, Alps, summits of the Vosges, Black Forest, Böhmer Wald, Riesen- and Erzgebirge, Gesenke, Carpathians, Caucasus, Arctic regions, Urals.

For further species of this genus see Plate 32, figs. 10 and 11.

Fig. 7. **Chrysánthemum alpínum** L., *Alpen-Wucherblume*.

Weisse Gamswurz, Almgranille (Carinthia), Riberöl (Tirol), Alpenkarmillje (Valais).

A plant 1–4 in. high, sending up flower-stalks and non-flowering shoots with tufts of leaves. Radical leaves pinnatifid, with a rounded-eggshaped outline and 3–7 comb-like teeth pointing towards the leaf-tip; stem-leaves linear or entire, all bare. Stem bearing a solitary flower-head. Bracts with a broad brown or blackish margin. All the fruits have a membranous pappus. Flowers in July and August.

Stony slopes and alpine meadows, from 5250 to 8850 ft. Especially frequent on clayey soil.—Pyrenees, Alps, Carpathians, Siebenbürgen.

See also *Chrysanthemum coronopifolium* (Plate 37, fig. 2).


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Compósitae. Composite Order (*Continued*)

Fig. 1. **Arónicum** (= *Dorónicum*) **scorpioídes** Koch, *Skorpions-Gemswurz.*

Gamswurzel (Eastern Alps), Hirschwurzn (Algäuer Alps), Schwindelwurz, Gelbe Gamsblüh, Wilder Tabak (Tirol), Gamsblüemli (Glarus), Grasägel, Grasägli (Berne, Lucerne), Johannisrose, Rote Gamswurz (Styria).

6–24 in. high. Rootstock creeping, with a sweetish taste when chewed. Stem erect, hollow, bearing 1–4 flower-heads; the upper part, like the involucre, being densely covered with glandular hairs. Lower leaves stalked, truncate or somewhat heart-shaped at the base, coarsely waved and toothed, often prolonged down the leaf-stalk; upper leaves eggshaped-lanceolate, toothed, sessile, half clasping the stem, covered with short glandular hairs and fringed with longer non-glandular hairs. Flowers deep yellow. Fruits with a hair-like pappus. Flowers in July and August.

Fairly widely distributed amongst boulders, on screes, and in stony places in the alps, from about 5250 to 8850 ft. Found on limestone only.

Pyrenees, Alps, Carpathians, Balkans, Corsica.

The closely related species *Arónicum* (= *Dorónicum*) *Clúsii* Koch is shown on Plate 37 (fig. 4). In the Eastern Alps the similar species *A. glaciále* Wulf., as well as *Dorónicum Colúmnae* Ten. and *Dorónicum Austríacum* Jacq., also occur.

Fig. 2. **Senécio Carniólicus** Willd., *Krainer-Kreuzkraut.*

Guldenkraut, Goldraute, Raute, Gelber Speik, Gelber Aberraut (Tirol).

2–5 in. high, rarely higher. Stem erect or ascending, bearing only a few leaves but numerous heads. The plant is grey and almost silky-looking owing to its covering of appressed downy hairs, but finally becomes almost bare and hence turns green. Leaves coarsely cut and crenate, or pinnatifid, with blunt, entire, or slightly crenate segments. Lower and intermediate leaves long-stalked; upper leaves sessile and less extensively divided. Flowers of a beautiful orange-yellow. Flower-heads with a small outer calyx at the base. Flowers in July and August.

Fairly common locally on rocky slopes in the higher alps, from 6250 to 9850 ft. Found on primitive rocks and schists.

Eastern chain of the Alps (westwards to Ticino), Carpathians. Found as a very rare plant in the Bavarian Alps near the Rappensee and on the Fellhorn in the Algäuer Alps.

Senécio incánus L. is a closely related species, which is distinguished by its deeply-cut leaves and its covering of snowy-white downy hairs. Another closely related species is *S. uniflórus* (see Plate 37, fig. 5).

Fig. 3. **Senécio Dorónicum** L., *Gemswurz-Kreuzkraut.*

Grosse Gemswurz (Bernese Oberland), Cardoncella (Ticino).

A plant 8–20 in. high, more or less covered with a spider's web of wool. Stem erect, with 1–3 (occasionally as many as 7) flower-heads. Leaves somewhat leathery, woolly or almost bare; lower leaves oblong-eggshaped, stalked, coarsely toothed, with somewhat recurved margins, upper leaves linear-lanceolate, sessile. Under side of leaves always hairier than the upper. Flower-heads with an outer calyx, the latter being nearly as long as the involucre. Strap-shaped florets golden-yellow or orange. Flowers in July and August.

Fairly common on stony slopes, in meadows, on screes, and amongst boulders in the alps, from 5250 to 10,175 ft. Flourishes on limestone.

Mountains of Spain, Pyrenees, Auvergne, Jura, Alps, Apennines, Carpathians, Siebenbürgen, North-western Balkans.

Fig. 4. **Artemísia spicáta** Wulf. (= *A. Genipi* Weber), *Schwarze Edelraute.*

2–6 in. high. Flowering-stems ascending, simple. Leaves grey with silky hairs, divided into linear-lanceolate segments, which are not

prickly. Lower and intermediate stem-leaves twice or thrice palmately divided, with an oblong outline, pinnatifid or pinnatifid-toothed. Small flower-heads almost globular, erect, arranged in a raceme or spike. Bracts of involucre woolly, with a dry membranous margin. Receptacle bare. Flowers in July and August.

Locally on rocks in the higher alps, from about 4600 to 11,150 ft.

Alps (Southern Switzerland to Styria). Not found in Bavaria, Lower Austria, or Upper Austria.

Fig. 5. **Artemísia Mutellína** L. (= *A. láxa* Fritsch), *Echte Edelraute.*

Wilde Wermueth, Gabüse, Schneppi (Switzerland), Edelraute (Tirol), Grüner Raut (Zillertal), Wildnis-Kraut (Eastern Tirol, Carinthia), jerba dell invidic (Val di Gardena).

A plant 4–12 in. high, with flowering and non-flowering stems and an aromatic smell. Flowering-stems erect, simple. Leaves whitish-grey, stalked; lower and intermediate stem-leaves palmate. Small flower-heads rounded to top-shaped, with 12–15 florets; the lower ones stalked, forming a racemose or spiked inflorescence. Flowers yellow. Receptacle slightly hairy. Flowers from July to September.

Locally on accumulations of humus, on dry, sunny rocks, and on screes in the high alps, from about 5250 to 11,500 ft. Found on primitive rocks and schists.

Pyrenees, Alps (in Bavaria found in the Karwendel, where it is very rare, and formerly found on the Höfats), North-western Balkans; not found in Lower Austria or Upper Austria.

Fig. 6. **Árnica montána** L., *Bergwohlverleih, Johannisblume.*

Fallkraut (Austria), Gemsblume (Bernese Oberland), Luzienkraut, Arnica (Upper Bavaria), Sternanis, Rinderblume, Gemswürze (Switzerland), Kraftwurz, Kathreinwurz, Kraftrosen, St. Luciuskraut (Alsace), Schnupftabaksblume (about Nürnberg), Sternüdella (Romansch-speaking Grisons).

1–2 ft. high. Stem usually unbranched, erect, with one or two pairs of sessile leaves. Other leaves springing from the root, stiff, covered with short glandular hairs, oblong-inversely-eggshaped, almost entire, 5-veined. Flower-heads large, usually solitary, less frequently 2–5 together. Flowers the colour of the yolk of an egg. Bracts of involucre lanceolate, pointed; the outer ones covered with short hairs, sometimes purple at the edge. Fruit covered with short hairs. Flowers from June to August.

Very common in clearings in woods where the soil is rich in humus, dry meadows, and peat bogs, from the foot of the mountains up to the level of the alps, rising to 9200 ft. Also found locally in the plains, but not on a purely calcareous soil.

Widely distributed in Europe and Northern Asia.

The plant avoids limestone and is a sign of the presence of humus. It has an aromatic smell and yields a well-known remedy for wounds (especially in the form of the tincture). In some places the roots are ground down by the peasants and used as snuff (*Schneeberger*) or smoked like tobacco. Cattle leave the plant untouched, but goats, on the other hand, enjoy eating it.

Fig. 7. **Homógyne alpína** Cass., *Alpen-Lattich.*

Zisibluemli, Ribibluemli (Switzerland).

4–16 in. high. Rootstock short and thick. Stem erect, woolly, almost leafless, bearing a solitary flower-head. Leaves all springing from the root, stiff, long-stalked, heart- or kidney-shaped, toothed-crenate, green on both sides, with hairs on the veins below. Bracts of involucre brownish-red, in a single row, tapering, often with a few additional scales at the base. All the florets are fertile. Disk florets numerous, funnel-shaped, tubular, bisexual; ray-florets thread-like, female, in a single row. Corolla reddish with purplish-red tips. Flowers from May to August.

Very common on pastures rich in humus, amongst mountain pine, on boggy heaths, and in woods in the alps and lower alps, up to about 10,500 ft.

Pyrenees, Jura, Alps, Black Forest (Feldberg), Upper Swabia (on the Adelegg), Bayerischer Wald, Riesen- and Erzgebirge, Carpathians, North-western Balkans, Apennines.

Homógyne discolor Cass. (*Verschiedenfarbige Alpenlattich*), which occurs in the Eastern Alps, may easily be recognized by its leaves, which are densely covered with soft wool below. In Bavaria it is found only in the eastern ranges of the Alps (Salzburgeralpen).


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Compósitae. Composite Order (*Continued*)

Fig. 1. **Crépis aúrea** Cass., *Gold-Pippau*, *Rinderblume*.

Gamswurz (Zillertal), Rahmbluomä, Goldritzli, Ankä- or Rinderblüemli (Switzerland).

2–12 in. high. Stem almost leafless, as a rule bearing one flower-head (less frequently 2–4); upper part, like the involucre, shaggy with black hairs. Leaves springing from the root, bare, waved and toothed, or runcinate (i.e. shaped like dandelion leaves), oblong-inversely-eggshaped. All the flowers strap-shaped, orange-yellow to fiery red. Involucre of several rows of bracts. The plant resembles the dandelion very much in its habit. Flowers from May to September.

Found everywhere in meadows and pastures and on banks of streams in the alps and lower alps, from 3950 to 8200 ft., occasionally even lower (to 1600 ft.).

Pyrenees, Jura, Alps, Siebenbürgen, Apennines. Flourishes on limestone.

The plant is a splendid fodder-plant and an important constituent in cattle pastures. In Switzerland the cowherds sometimes use the red flowers for colouring cheese or for making a tea for chest complaints.

Fig. 2. **Leóntodon híspidus** L., *Steifhaariger Löwenzahn*, Rough Hawk-bit.*

A plant 6–12 in. high, very variable in size. Stem bearing one flower-head, without scales or with at most 1–2 scale-like bracts, more or less covered with forked hairs, usually unbranched, slightly thickened at the top. Radical leaves arranged in a rosette, oblong-inversely-eggshaped, waved and toothed to pinnatifid, tapering into the leaf-stalk. The amount of hairiness and the form of the leaf-margins are very variable. Flower-head nodding before flowering. All the florets strap-shaped. Flowers from May to October.

Very common in meadows and pastures, from the plains up to the level of the alps, to 8850 ft.; often associated with the preceding species. A good fodder-plant.

The slender *Leóntodon Pyrenáicus* Gouan (*Pyrenäen-Löwenzahn*), which is a closely-related species, is easily recognizable by the numerous scale-like bracts under the flower-head.

Fig. 3. **Mulgédium** (= *Cicérbita*) **alpínum** Less., *Alpen-Milchlattich*, Alpine Lettuce.*

Milchheider (Styria), Milchkraut (Carinthia), Berghasenköhli, Blauer Bergkohl, Gansdistel (Switzerland).

A handsome shrub 2–5 ft. high. Leaves lyrate, with a very large triangular-spearshaped terminal segment. Flower-heads in simple or compound racemes covered with glandular hairs. All the florets strap-shaped, bluish-violet, very rarely white. Fruit oblong-linear, with many ridges, tapering somewhat at the tip. Flowers in July and August.

Fairly common in woods and thickets in the alps and lower alps, from about 3300 to 6550 ft. Flourishes on marly soil and commonly found growing with the *Alpen-Erle*, *Adenostyles albifrons*, and *Peucedanum Ostruthium* (*Meisterwurz*, Masterwort *).

Pyrenees, Jura, Alps, Vosges, Black Forest, Deutsche Mittelgebirge, Gesenke, Carpathians, Siebenbürgen, Balkans, Caucasus, Northern Europe.

Fig. 4. **Hypochóeris uniflóra** Vill., *Einköpfiges Ferkelkraut*.

6–20 in. high. Stem with a few leaves and usually bearing one flower-head (less frequently 2); upper part, just below the large

flower-head, conspicuously thickened and covered with stiff hairs. Radical leaves arranged in a rosette, oblong-lanceolate, waved and toothed, covered with somewhat stiff hairs, brilliant green, with prominent midribs. Flower-head deep yellow, containing strap-shaped florets only. Pappus white and feathery. Outer and middle bracts of involucre fringed at the edges. Flowers in July and August.

Locally found in great numbers in pastures, damp ravines, woods and thickets of *Alpenerle*, from about 5600 to 8850 ft. Almost exclusively found on primitive rocks. Not found in Lower Austria or Upper Austria; in Bavaria found only in the Algäuer Alps.

Alps, Riesengebirge, Gesenke, Carpathians.

Fig. 5. **Hierácium villósum** L., *Zottiges Habichtskraut.*

4–14 in. high. The whole plant covered with long hairs, which are generally white but may be black at the base only. Stem ascending, leafy, bearing one or more flower-heads. Leaves bluish-green, oblong-lanceolate, usually entire, often with waved margins; stem-leaves half clasping the stem, sessile, egg-shaped, gradually diminishing in size upwards. Bracts of involucre tapering, rough-haired; outer bracts broad, spreading, almost leaf-like, inner bracts narrower. All the florets strap-shaped. Flowers in July and August.

Very common on rocks and stony slopes, in river gravel and on screes in the alps and lower alps, from about 4250 to 8850 ft. A limestone plant.

Pyrenees, Jura, Alps, Gesenke, Carpathains, and Abruzzi.

Fig. 6. **Hierácium** (= *Chlorocrépis*) **staticifólium** Vill., *Strandnelkenblätteriges Habichtskraut.*

6–12 in. high, with subterranean runners. Stem with a rosette of radical leaves, simple, almost leafless, with scales towards the top, bearing 1–5 flower-heads. Leaves bluish-green, narrow, linear-lanceolate, bare, with serrations at intervals, or entire. Stems of flower-heads grey with down. Outer bracts of involucre few in number, short; inner bracts long, linear. All the florets strap-shaped, light yellow, green when dried. Flowers in July and August.

Locally on rocks, amongst boulders and on the river-gravel of alpine streams, up to about 8200 ft.; often descending a long way into the plains, in Bavaria to Neu-Ulm, Augsburg, Landshut, Gars, and Simbach.

Alps, Jura, Siebenbürgen.

Fig. 7. **Hierácium aurantíacum** L., *Orangerotes Habichtskraut.*

Goldenes Mausöhrlein, Dukatlein (Switzerland).

8–20 in. high. Stem with scaly underground runners and thin runners above ground with small leaves, bearing 2–12 flower-heads, covered with numerous long reddish-brown to blackish hairs, with glandular hairs above. Radical leaves grass-green, forming a rosette; stem leaves (1–4) rapidly diminishing in size, rough-haired on both sides. Flower-heads of medium size, forming a corymb. All the florets strap-shaped, purplish-red, less frequently orange-yellow. Bracts of involucre blunt, covered with stellate hairs and black glandular hairs. Flowers in July and August.

On alpine pastures, from about 4900 to 8550 ft.; locally fairly common.

Alps, Vosges, Black Forest, Riesengebirge, Gesenke, Beskiden, Carpathians. This species is also grown for ornament in many places and thus is sometimes found naturalized.


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Fig. 1. **Anemóne Baldénsis** L., *Tiroler Windröschen* (Ranunculaceae).

2–5 in. high, as much as 8 in. high when in fruit. Stem erect, covered with woolly hair, bearing a solitary flower. Radical leaves long-stalked, ternate, with stalked, doubly ternate segments and 2 3 lobed tips. Bracts of involucre similarly shaped, usually below the middle of the stem. Flowers as a rule solitary, somewhat nodding, white, 1–1·5 in. across, usually with 8–10 pointed egg-shaped petals, which are hairy outside, and numerous yellow stamens. Fruiting heads erect on the greatly lengthened stalks, with numerous flattened, blackish-brown carpels, which are beaked and winged and fringed with rough hairs, and have long hairs at the tip. Flowers from June to August.

Locally on dry stony meadows, on rocks, and between boulders at the level of the alps, from about 5900 to 9850 ft. Not found in Bavaria. In Austria especially frequent in the Southern Alps. Occasionally found in Switzerland; not found in the Grisons. Prefers limestone.

Pyrenees, Alps (occurring occasionally from Piedmont to Carinthia and the Schneeberg near Vienna), Carpathians, mountains of the Pacific coast of North America.

Fig. 2. **Ranúnculus Seguiérii** Vill., *Seguier's Hahnenfuss* (Ranunculaceae).

3–6 in. high, with a habit resembling that of the preceding species or of *Ranunculus glacialis*. Rootstock short, with very long vigorous lateral roots. Stem erect, with 1 3 flowers. Radical leaves stalked, palmate, with 3–5 segments, with repeatedly divided leaflets and sharply tapering lobes, covered with shaggy hair like the whole plant (at least originally), later becoming bare. Leaf-stalk forming a broad sheath at the bottom. Flowers erect, as much as 1 in. across. Divisions of the perianth 5, egg-shaped, bare, shorter than the snow-white rounded nectaries. Fruits few in number, very large, globular, much inflated, with a distinct network of veins and a slender hooked beak. Flowers in June and July.

Rare; found on damp, grassy slopes, among damp rocky debris and in clefts of rocks at high alpine levels, from about 5900 to 7850 ft. Found only on limestone. Not found in Bavaria. In Austria occasionally found in Southern Tirol and Carinthia; also in Carniola. In Switzerland it is found only on the mountains about Giswil in Obwalden.

Western Alps, southern limestone Alps, Central Apennines.

Fig. 3. **Ranúnculus pygmæus** Wahlenberg, *Zwerg-Hahnenfuss* (Ranunculaceae).

A bare little plant ·6–1·6 in. high, with a tuberous, abruptly terminated rootstock and numerous lateral roots. Radical leaves 1 or 2, less frequently as many as 4, stalked, with a broadly heart- or kidney-shaped outline, usually 5-lobed, with a broad white membranous sheath at the bottom. Stem-leaves usually 2, deeply 3-cleft. Stem bearing a solitary flower, covered with short fine hairs. Flowers small, inconspicuous. Divisions of the perianth 5, egg-shaped, pale yellow, often with somewhat reddish streaks outside. Nectaries 5, pale yellow, slightly notched. Carpels very numerous (50 to 60), egg-shaped, smooth, unveined, with a bent beak. Flowers in July and August.

Very rare; found in "snowy valleys", beside glaciers, and in avalanche tracks of the Central Alps, from 5900 to 8550 ft. Found on schists and primitive rocks. Not found in Bavaria. In Austria occurs very occasionally in Tirol, Salzburg (Hafnereck) and Upper Carinthia. In Switzerland found only in the Lower Engadine (Val Zeznina near the Macun lakes).

Central Alps, Western Carpathians, Arctic regions of Europe, Siberia, and America, Rocky Mountains.

Fig. 4. **Ranúnculus crenátus** Waldst. et Kit., *Gekerbter Hahnenfuss* (Ranunculaceae).

1·5–4 in. high. Rootstock short, cylindrical, with very strong, almost vertical lateral roots. Stem with 1–2 flowers, bare, with 1–2 lanceolate or linear leaves. Radical leaves stalked, almost circular, slightly heart-shaped at the base, bare, indistinctly 5-veined, with crenate margins and a sheath at the base. Flowers erect, as much as ·8 in. across. Divisions of the perianth egg-shaped, shorter than the white nectaries, which have wavy margins and are usually 5 in number. Carpels bare, smooth, suddenly tapering into the long, almost straight beak. Flowers in June and July.

On damp places by springs, in clefts of rocks, and at the edge of the snow, from 5600 to 7850 ft. Only in the Central Alps of Styria, and there only in the Rottenmanner Tauern.

Styrian Alps, Carpathians, Siebenbürgen, mountains of the Balkans.

Fig. 5. **Ranúnculus hýbridus** Biria (= *R. pthóra* Crantz), *Bastard-Hahnenfuss* (Ranunculaceae).

Like *Ranunculus Thora* L. (Plate 11, fig. 4), but usually smaller, only 4–6 in. high. Root stock very short, with numerous fleshy, thickened lateral roots. Radical leaves always definitely developed, usually 2 (rarely 4), long-stalked, kidney-shaped, crenate to sharply-toothed. Stem erect, bare, not much branched, lower stem-leaves short-stalked, kidney-shaped, crenate, upper ones 3–5 toothed, the uppermost being lanceolate and entire; all the leaves stiff, covered with a bluish-green bloom, with raised veins, especially on the under side. Nectaries usually 5, yellow, broadly egg-shaped, as much as ·25 in. long. Fruits not

numerous, as much as ·16 in. long, almost globular, bare, with raised veins and a short beak. Flowers from June to August.

Locally on debris, in clefts of rocks, and amongst mountain pine, from about 5250 to 8200 ft., sometimes descending even lower (to 3050 ft.). Found only on limestone and dolomite. In Bavaria found only on the Soyernspitz, the Jenner, and the Torrenerjoch. Fairly widely distributed in Austria in the northern and southern limestone Alps. Not found in Switzerland at all.

Fig. 6. **Aquilégia Einseleána** F. W. Schultz (= *A. Pyrenáica* Koch), *Einsele's Akelei* (Ranunculaceae).

6–16 in. high. Stem erect, usually unbranched, with only a few leaves, bare. Leaves twice ternate, stalked, with stalked segments, bare; leaflets wedge-shaped at the base, usually deeply lobed or crenate. Upper stem-leaves entire. Flowers small, bluish-violet. Divisions of the perianth oblong-eggshaped, deciduous. Nectaries 5, hood-shaped, with a long, almost straight spur. Stamens shorter than the nectaries, numerous, the inner ones barren. Follicles erect, with a criss-cross of veins, shortly beaked. Flowers in June and July.

Rare; found in rocky places and among rocky debris in the Eastern Alps, up to about 5900 ft.; on calcareous soil only. In Bavaria it occurs only in the Berchtesgaden Alps. In Austria found in Salzburg (Bundschuh in the Lungau), Carinthia, Friaul, and Tirol (almost exclusively in the south; in Northern Tirol it occurs only on the Hinteres Sonnwendjoch). Found in the Kanaltal in Carniola. In Switzerland found only in Southern Ticino (Monte Generoso).

Southern limestone Alps (from the Lake of Como to Carinthia), and occasionally in the northern limestone Alps.

Besides this species, the following occur in the Alps: *Aquilégia vulgáris* L. (Common Columbine *) with nodding dark blue or dull violet flowers having a hooked spur (widely distributed, from the plains up to 6550 ft.); *A. alpína* L., with very large flowers 2–3 in. across, of a beautiful blue colour and having a straight spur (Western Alps, Switzerland, Vorarlberg), and *A. thalictrifólia* Schott et Kotschy, with smaller, bluish-violet flowers, which likewise have a straight spur, and leaves sticky with glandular hairs (Southern Tirol, Venezia).

Fig. 7. **Drába Sautéri** Hoppe, *Salzburger Felsenblümchen* (Cruciferae).

A compact, prostrate plant, 2–6 in. high, with shoots densely covered with overlapping leaves. Withered leaves persisting for a long time. Leaves lanceolate, leathery, shiny, with comb-like fringes. Flowers in cymes of 2–5, short-stalked. Sepals ·1 in. long, edged with a white membrane. Petals ·16–·2 in. long, with a short claw, bright yellow. Stamens half as long as the petals. Fruits in a corymb which is not lengthened, on spreading stalks, rounded to broadly lanceolate, ·16–·2 in long, and up to ·12 in. broad. Style ·02–·04 in. long. Flowers in June and July.

Occasionally found on rocks and heaps of debris, from 6250 to 8200 ft. A limestone-loving plant. In Bavaria found only in the Berchtesgaden Alps. In Austria found occasionally in Salzburg, Upper Austria (Warschenegg), Styria, and Tirol. Not found in Switzerland.

Fig. 8. **Drába Fladnizénsis** Wulfen (= *D. Wahlenbérgii* Hartm.), *Fladnitzer Felsenblümchen* (Cruciferae).

·4–3 in. high, forming dense carpets or cushions. Shoots numerous, covered with the remains of dead leaves. Stem low, erect, leafless or with 1–2 leaves. Leaves inversely-egg-shaped to lanceolate, gradually tapering into the stalk, fringed at the margin with simple hairs, bare or sparsely haired on the surface, occasionally quite bare. Inflorescence a corymb of a few flowers; flower-stalks spreading, not more than ·1 in. long. Sepals bare, not more than ·1 in. long, edged with a white membrane. Petals ·08–·12 in. long, tapering like a wedge, white. Pouches in a short raceme, on bare stalks standing up erectly, eggshaped-elliptic, bare. Style wanting, or not more than ·01 in. long. Flowers from June to August.

Rather uncommon; found on rocky ridges, amongst fine debris and on rocks at the level of the alps, from 6400 to 11,200 ft. Found on primitive rocks and also, but less frequently, on limestone. In Bavaria found as a rare plant in the Algäuer Alps.

Pyrenees, Alps, Altai Mountains, Himalayas, Arctic regions.

Fig. 9. **Drába dúbia** Suter (= *D. frígida* Sauter), *Kälteliebendes Felsenblümchen* (Cruciferae).

1–5·5 in. high, forming a loose carpet. Root thin, spindle-shaped, branched. Stem erect, sparsely leaved, more or less covered with stellate hairs. Leaves narrow, inversely egg-shaped, entire, with stellate hairs at intervals. Inflorescence a loose corymb containing a good many flowers. Flowers on erect stalks as much as ·2 in. long. Sepals up to ·1 in. long, bare or covered with simple hairs, edged with a white membrane. Petals white, up to ·2 in. long. Pouches elliptic, ·25–·5 in. long and ·08–·12 in. broad, bare or with hairy margins, on stalks standing up erectly, ·1–·6 in. long, bare or with stellate hairs at intervals. Flowers from April to July.

Widely distributed, but not common, in clefts of rocks or on rocky debris, from 4250 to 12,450 ft. Found on all kinds of subsoil. In Bavaria it is apparently found only on the Höfats in the Algäuer Alps.

Mountains of Spain, Pyrenees, Alps, Altai Mountains.


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Tab. 32.

Fig. 1. **Valeriána elongáta** L., *Ostalpen-Baldrian* (Valerianaceae).

2–10 in. high. Rootstock cylindrical, sending up many shoots. Stem simple, with 1–2 pairs of leaves. Leaves bare, shining; radical leaves on fairly long stalks, egg-shaped, usually entire, tapering into the stalk; stem-leaves sessile or on very short stalks, egg-shaped or almost triangular, blunt, coarsely toothed. Flowers growing a few together in short-stalked cymes, forming a narrow raceme. Corolla funnel-shaped, ·08–·1 in. long, with a short tube, brownish-violet, finally greenish-brown. Flowers from June to August.

Rather uncommon; found in clefts of rocks and amongst rocky debris in the eastern limestone Alps, from 5600 to 7200 ft.

Fig. 2. **Valeriána Céltica** L., *Gelber* or *Roter Speik* (Valerianaceae).

·8–6 in. high. Rootstock cylindrical, sending up many shoots, with a penetrating smell of valerian. Stem erect, channelled, bare, with 1–2 pairs of leaves. Leaves bare, shining, dark green; radical leaves inversely egg-shaped, blunt, entire. Flowers a few together in opposite cymes which are sessile or short-stalked, forming a cylindrical raceme. Corolla ·08 in. long, yellowish-white, often reddish on the outside. Flowers in July and August.

Pastures on deep soil, especially in the Eastern Alps, from 6550 to 9200 ft. In Switzerland found only in the southern chain of the Pennine Alps. Not found in Bavaria.

The root of this strong-smelling plant is used in many ways in perfumery and also for incense. Formerly it was industriously collected in Carinthia and Styria to a greater extent than at the present time. The haunts of the plant have long been called " Speikböden " by the common people. The plant is also much liked by game.

Fig. 3. **Valeriána saliúnca** All., *Weidenblättriger Baldrian* (Valerianaceae).

2–6 in. high. Rootstock sending out numerous stems bearing short rosettes. Stem erect, bare, usually with only one pair of leaves, sometimes with none. Leaves bare, somewhat fleshy; radical leaves inversely eggshaped-oblong, blunt, entire, stem-leaves lanceolate to linear or 3-cleft. Flowers in a small head, surrounded by bare, linear bracts edged with a narrow membrane. Corolla ·2 in. long, pale reddish. Flowers in July and August.

Found in rocky places, stony pastures, and clefts of rock in the alps, but only in Tirol (Pfitscherjoch, Monzonigebirge) and Western Switzerland (Valais, Fribourg, Bernese Oberland) between 5900 and 8550 ft. Also found in the Abruzzi.

Fig. 4. **Campánula alpína** Jacq., *Alpen-Glockenblume* (Campanulaceae).

2–6 in. high, biennial or perennial. Stem erect, branched, sparsely covered with woolly hairs. Leaves shaggy with wool, inversely lanceolate to linear-lanceolate, pointed, entire. Inflorescence a raceme, usually of many flowers, sometimes reaching to the foot of the stalk; flowers long-stalked, nodding. Calyx shaggy with wool, with a short tube and a small reflexed appendage in the hollows between the teeth. Corolla bell-shaped, light bluish-lilac, fringed inside. Flowers in July and August.

Locally in stony meadows, on rocks and amongst mountain-pine in the Bavarian Alps (westwards as far as the Wendelstein), Salzburg, Upper and Lower Austria, Styria, and Carinthia; between 4250 and 7850 ft. Not found in Tirol, the Algäuer Alps, Carniola, or Switzerland. Occurs in the Carpathians.

Fig. 5. **Campánula Morettiána** Rchb., *Dolomiten-Glockenblume* (Campanulaceae).

1–2 in. high. Stems usually numerous, ascending or erect, covered with the remains of leaves, with stiff projecting hairs, bearing a solitary flower. Leaves greyish-green, densely covered with stiff projecting hairs; lower leaves long-stalked, rounded, with angular teeth, upper leaves sessile, rounded or egg-shaped, pointed, with 2–3 serrate teeth on either side. Flowers solitary, terminal, erect. Calyx covered with bristly hairs, with entire, lanceolate, pointed teeth, about a fourth as long as the funnel- to bell-shaped corolla, which is ·8–1 in. long, and purplish-red (with a tinge of blue). Flowers in August and September.

In clefts and fissures on bare precipices, less frequently among boulders, from 4900 to 7550 ft. Found only in the Dolomites of Southern Tirol and the neighbouring parts of Venezia.

In the Dolomites, where this large-flowered plant prefers to establish itself under rocks dripping with water, it is sometimes so firmly attached to the rock that a chisel is required to remove it. In the Schlern group it has been almost exterminated from easily accessible places.

Fig. 6. **Campánula Rainéri** Perpenti, *Insubrische Glockenblume* (Campanulaceae).

2–4 in. high. Rootstock branched, creeping, sending out small stems bearing rosettes. Stem erect, covered with short down, somewhat sharply edged, bearing a solitary flower. Leaves with short hairs at intervals; lower and intermediate leaves stalked, elliptic, crenate-serrate, upper leaves sessile, lanceolate, pointed. Flowers solitary, terminal, erect. Calyx somewhat downy, divided into broadly lanceolate tips with teeth at wide intervals and 3 distinct veins. Corolla opening wide, funnel-shaped, ·8–1 in. long and 1–1·6 in. across, cleft a third of the way down, light bluish-lilac. Flowers in August and September.

A rare plant, found on rocks and rocky debris in the southern limestone Alps between Lake Lugano and Lake Garda, from 4250 to 7850 ft.

Fig. 7. **Campánula púlla** L., *Dunkle Glockenblume* (Campanulaceae).

2–6 in. high. Rootstock slender, creeping, sending out numerous stems and subterranean runners. Stem ascending or erect, often bent, always simple, bearing a solitary flower. Leaves bare, rather shiny, bluntly serrate; radical leaves rounded-spatulashaped, blunt, upper stem-leaves lanceolate. Flowers solitary, terminal, long-stalked, nodding. Calyx with linear, pointed, bare, erect teeth. Corolla forming a wide bell, ·6–·8 in. long, dark violet, very rarely white. Flowers in July and August.

Locally on stony, grassy, or marshy pastures, and among rocky debris at the level of the Alps, from 4900 to 7200 ft., sometimes carried down even lower by streams. Found on limestone and also, but less frequently, on schists. Found only in the Austrian Alps, as far west as Salzach. Not found in Tirol, Bavaria, Switzerland, or the Southern Carpathians.

Fig. 8. **Campánula Zoýsii** Wulf., *Nickende Glockenblume* (Campanulaceae).

·8–4 in. high. Rootstock short, branched, sending out small creeping stems. Stem ascending, less frequently erect, bare, simple. Leaves bare; radical leaves egg-shaped to rounded, entire or somewhat crenate towards the base, suddenly tapering into the stem. Upper stem-leaves fringed with bristly hairs, elliptic to oblong, entire, almost sessile. Flowers often nodding, stalked, 1–4 together, in a raceme. Calyx-teeth much shorter than the corolla, spreading, fringed with bristly hairs. Corolla cylindrical, ·6–·7 in. long, gradually narrowing from the swollen base to the mouth, which is ·2 in. across, with short triangular teeth which are bent towards each other, light bluish-violet. Flowers in July and August.

Rare; found on rocks and rocky debris in the south-eastern limestone Alps, but only in the regions of the Julian Alps, Karawanken, and Sanntaler Alps, through Carinthia, Southern Styria, Carniola, and Gorizia, but not in Southern Tirol.

Fig. 9. **Phyteúma betonicifólium** Vill., *Voralpen-Rapunzel* (Campanulaceae).

Joggelä, Joggerä (Switzerland).

8–28 in. high. Root fleshy, shaped like a carrot. Stem erect, bare or hairy at the bottom, almost leafless above. Leaves bare or sparsely haired; radical leaves long-stalked, eggshaped-lanceolate to lanceolate, usually heart-shaped at the base, crenate to serrate. Stem-leaves narrower, lanceolate to linear. Inflorescence a cylindrical spike surrounded at the base by very small bristle-shaped bracts. Flowers bluish-lilac, rarely white, almost straight before flowering. Style with three (rarely only two) stigmas. Flowers from June to September.

Fairly widely distributed in rocky pastures, on rocks, in thickets and open woods in the alps, from 2950 to 8550 ft. Prefers a non-calcareous soil. In Bavaria found only in the Algäuer Alps, from 3600 to 6700 ft.

Fig. 10. **Gnaphálium Hoppeánum** Koch, *Alpen-Ruhrkraut* (Compositae).

·8–4 in. high. Rootstock short and cylindrical, sending out many shoots. Stem erect, simple, almost thread-like, white with down. Leaves entire, covered with flat greyish-white down, more thickly on the under side; lower leaves lanceolate, ·08 to ·16 in. broad, one-veined, tapering slowly towards the base; upper leaves linear-lanceolate, sessile. Flower-heads ·2 to ·32 in. long, united 1–5 together to form a terminal spike, interspersed with leaves at the foot. Scales of involucre usually in several rows, with a broad brownish-black margin; the outer ones woolly, as long as the flower-head. Flowers a pale brownish colour. During and after ripening the involucre is broadly bell-shaped. Fruit ·05 in. long, covered with short hairs. Flowers in July and August.

Found in stony meadows and on screes in the Alps between 4900 and 8700 ft., very occasionally descending even lower (to 3600 ft.). Found on calcareous soil only. Also occurs in the Riesengebirge.

Fig. 11. **Gnaphálium supínum** L., *Zwerg-Ruhrkraut*, Dwarf Cudweed, Mountain Cudweed * (Compositae).

·8–5 in. high. Rootstock slender, creeping, forming small carpets. Stem slender, almost thread-like, simple, white with woolly hairs. Leaves thinly covered on both sides with silky wool, linear-lanceolate, ·04–·08 in. broad, pointed, usually barely ·8 in. long. Flower-heads ·2–·25 in. long, growing 2–6 together in a terminal spike, which at first is usually compact, opening out later, rarely solitary. Bracts as a rule not longer than the flower-heads. Bracts of involucre few in number, elliptical, with a brown membranous edge; outer ones about two-thirds as long as the inner ones and more than half as long as the flower-head. Involucre spreading like a star when in fruit, not bell-shaped. Fruit covered with short hairs. Flowers from June to September.

Locally common in damp pastures rich in humus, in " snowy valleys " and watercourses, on moraines, and among boulders in the high alpine regions of the Alps, from 5250 to 9850 ft. Prefers primitive rocks. Also occurs as a rare plant in the Swiss Jura (Reculet), on the Feldberg in the Black Forest, in the Riesengebirge, Gesenke, Pyrenees, Carpathians, Balkan Mountains, and Northern and Arctic Europe and America.

This whitish little plant is an almost invariable constituent of the flora of the " snowy valleys ", and is much sought after by sheep.

Lycopodiáceae. Club-Moss Order

Perennial plants with repeatedly forked roots. Shoots usually very long, branching, creeping, less frequently ascending, densely covered with small, entire, sessile leaves which are usually very narrow. Spores of one kind, yellow, dust-like. Spore-cases (*sporangia*) rounded-kidneyshaped, bursting diagonally with two valves, growing in the axils of ordinary leaves or of bracts and in conjunction with these forming spikes.

Fig. 1. **Lycopódium Selágo** L., *Tannen-Bärlapp*, Fir Club-Moss.*

Tangelkraut (Central Germany), Lauskraut (Böhmerwald, Zillertal, Carinthia), Maschlaber, Maschleber, Mirschemel, Mürsemau (East Prussia), Teufelshand (Carinthia).

2–12 in. high, dark green (or in sunny situations yellowish-green), shining. Stem ascending, once or twice forked; branches close together, more or less of the same height, often forming dense tufts. Leaves linear-lanceolate, tapering, entire or toothed at intervals, spreading or closely overlapping one another like tiles on a roof, rough. Spore-cases in the axils of ordinary leaves, in the middle of the shoot. In fruit from July to October.

Fairly common and fairly widely distributed in shady, dampish woods, on pastures, in marshes, and on old tree-roots, from the plains up to the level of the alps (to about 9850 ft.).

An almost cosmopolitan mountain plant, though, to be sure, it is not found in dry regions.

Short-stalked bulbs which readily drop off when touched are not infrequently developed at the tops of the shoots.

Several other Club-Mosses are found in the Alps besides this species: all of them have their spore-cases in well-defined yellowish spikes. They are as follows: Common Club-Moss * (*Lycopódium clavátum* L., *Schlangenmoos*), which has yard-long shoots and leaves terminated by a white hair; Interrupted Club-Moss * (*Lycopódium annótinum* L., *Sprossender Bärlapp*), with equally long creeping branching shoots, and slightly tapering, finely serrate leaves, which are bent backwards or project rigidly; and Alpine Club-Moss * (*Lycopódium alpínum* L., *Alpen-Barlapp*), with flat, bluish-green, tufted branches. The spores of the Club-Mosses, which are sometimes referred to as "vegetable brimstone" [German popular names are *Blitzpulver*, *Frattpulver* (*Frattsein* means soreness in children), *Hexenmehl*, *Pflanzenschwefel*, *Stupp*], have been used from ancient times for applying to chafed places on the skin of infants, and also in the theatre for imitating lightning.

Polypodiáceae (Fílices). Fern Order

Almost invariably perennial plants with a creeping rootstock above or below ground, and a stem. Leaves ("fronds") rolled up in a spiral (like a bishop's crook) when young, often densely covered with chaffy scales. Blade of frond usually well-developed, bearing on its under surface the little groups of spore-cases (*sori*), which are naked or covered with a membrane (*indúsium*), rounded, kidney-shaped or linear in shape, and as a rule finally become brown in colour. The ferns, over 3000 species of which are known, are to be regarded as essentially woodland plants or damp-loving plants which grow in shady places rich in humus; hence they are represented only to a small extent in alpine regions.

Fig. 2. **Allósorus crispus** Bernh. (= *Cryptográmme crispa* R. Br.), *Rossfarn*, Rock Brake, Parsley Fern.*

6–12 in. high. Rootstock short, branched, creeping, sending up a fairly close tuft of long-stalked fronds of a delicate greenish-yellow colour; fronds twice to four times pinnate, but very variable in shape; outer fronds with a triangular egg-shaped outline, barren, inner fronds with an oblong outline and linear, semi-cylindrical leaflets, fertile, i.e. bearing *sori* on the under side. *Sori* rounded or oblong, at first completely covered by the edge of the leaf, which is rolled back like an *indusium*, finally becoming naked as the leaf uncurls. In fruit in August and September.

Locally amongst boulders and on rocks at the level of the alps, up to 7850 ft.; sometimes descending a long way (to 825 ft.) in the Southern Alps. Found only on non-calcareous subsoils, and accordingly it is not found at all in the limestone Alps of Bavaria, Lower and Upper Austria, and Carniola.

Pyrenees, Auvergne, Ardennes, Central Alps, summits of the Vosges (Hohneck, Sulzer Belchen), Black Forest (Hofsgrund, Siegelau), Bayerischer Wald (Arber, Keitersberg), Riesengebirge, Carpathians, Balkans, Caucasus, Scandinavia, Northern Russia; in slightly differing forms in the Himalayas, Northern China, Japan, North-western America, and the Southern Andes of Chile.

Fig. 3. **Cystópteris régia** (L.) Bernoulli, *Alpen-Blasenfarn*, Alpine Bladder-fern.*

4–8 in. high. Rootstock short. Leaves very delicate, long-stalked, lanceolate in outline, thrice pinnate, with rather small linear or lanceolate segments; veins usually passing into the

margins of the leaflets. *Indusium* attached to the bottom of the *sori* only, finally reflexed. In fruit in July and August.

Locally in clefts of rocks, on *Karrenfelder* (i.e. elevated barren stretches of limestone rock), and among boulders in the alps, from about 3950 to 9200 ft., sometimes descending lower (to 1975 ft.). Especially frequent on limestone, but not confined to it.

Pyrenees, Alps, Jura, Bayerischer Wald (Arber), Carpathians, Balkans, Asia Minor, Great Britain, Sweden.

Fig. 4. **Asplénium físsum** Kit., *Zarter Milzfarn.*

1–6 in. high. Rootstock slender, fairly long, creeping, covered with dark brown to blackish chaffy scales. Fronds delicate, light green, in dense tufts, very finely divided, with an egg-shaped to lanceolate outline, three to four times pinnate. Stalk of frond brownish-black towards the foot. *Sori* oblong to linear. In fruit from July to September.

Very rare: found among boulders and in clefts of rocks in the limestone Alps of Bavaria (Rauschberg and Seehauser Kienberg near Ruhpolding), Upper and Lower Austria, Styria, Southern Tirol (Borgo di Valsugana), Carniola, and Istria. Not found in Switzerland.

Eastern Alps, mountains of Southern Italy, Croatia, Balkans.

Plate 34.

Fig. 1. **Paradísia Liliástrum** (L.) Bertol., *Alpen-Trichterlilie.*

Santihansmeil (Valais).

A perennial plant, 12–20 in. high. Rootstock short, with rather thin tufted roots. Stem erect, slender, unbranched, leafless. Leaves springing from the root, grass-like, linear, flat, up to ·2 in. broad. Flowers funnel-shaped, stalked, sometimes as many as 20, forming a loose one-sided raceme. Bracts gradually tapering, longer than the flower-stalks. Segments of perianth snow-white, with a claw, pointed, up to 2 in. long, with three veins meeting at the tip. Stamens 6, much shorter than the perianth. Style 1, thread-like, expanding into a knob at the top. Fruit an egg-shaped to three-edged, transversely-wrinkled capsule splitting into cells. Seed triangular, black, about ·1 in. across. Flowers in June and July.

Locally on rich pastures, on sunny slopes, among *Alpenerle*, and in the south also in chestnut woods, from about 5600 to 7800 ft., sometimes descending even lower (by Lago Maggiore to 675 ft., together with the *Alpenrose*).

Pyrenees, Western, Central, and Southern Alps, Jura (Dôle), Apennines. In Austria only in Southern Tirol and Carinthia. Found in Carniola, but not in Bavaria. Is also occasionally grown in gardens.

Fig. 2. **Verátrum álbum** L., *Weisser Germer* (Liliaceae).

Germele, Girmel, Görbala, Gärwera (Switzerland), Hemmer (Lower Austria), Hammer (Carinthia), Hematwurze (Berchtesgaden), Tschamarika, Zemmer (Carinthia), Lauswurz (Algäuer Alps), Schwab'nwurz (Lower Austria), Chäferworzel (St. Gallen), Gillwurz (Upper Austria), Oldocke, Wendedocken (Riesengebirge), Tuzchüls, Risch malam, Malom salvatg, Veladru (Romansch-speaking Grisons).

A perennial plant 20 in. to 5 ft. high. Rootstock fleshy. Stem strong, erect, leafy, densely hairy, especially towards the top. Leaves alternate, with deep longitudinal furrows, felted with down below, bare above; lower leaves elliptical, upper leaves lanceolate. Flowers ·3–·6 in. across, white or yellowish-green to greenish, the lower ones bisexual, the upper ones mostly male, stalked, forming a terminal panicle of spike-like racemes with broadly egg-shaped bracts. Stamen-filaments attached to the base of the divisions of the perianth; anthers bursting transversely with two valves. Capsule ·4–·6 in. long, sparsely haired, tapering into a bent or hooked spine; seeds numerous, winged all round. Flowers from June to August.

Common and often gregarious in damp meadows, marshes, pastures, open woods, alder thickets, and at the bottom of corries in mountainous and alpine regions, up to 8625 ft., sometimes descending a long way, as e.g. in the plains of Upper Silesia and Poland. The species has recently been divided into several sub-species, four of which occur in Europe.

Pyrenees, Alps, Jura, Vosges, Swabian-Bavarian plateau, Sudetes, Deutsche Mittelgebirge to the Sudetes, Carpathians, mountains of Southern Europe, Finland, Russia, Siberia to Kamchatka, Altai Mountains, Japan, Arctic regions.

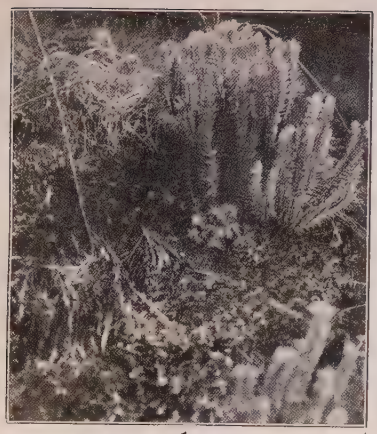
This handsome but poisonous meadow plant may easily be mistaken when out of flower for *Gentiana lutea* (*Gelber Enzian*); the leaves of the latter, however, are opposite and bare on the under side. *Veratrum album* is always left untouched by cattle. In sunshine the flowers exhale an overpowering scent and are visited by flies, ichneumon flies, and butterflies. A good many of the individual specimens in a meadow are always barren.

Fig. 3. **Festúca vária** Haenke, *Bunt-Schwingel* (Gramineae).

A perennial 6–14 in. high, greyish-green, forming very dense firm clumps. Shoots all sheathed. Stem usually slender, more or less erect, usually bearing two leaves. Blades thick, with a sharp point, usually folded like a bristle, almost rush-like. Sheaths smooth; ligule short, truncate or blunt. Panicle 1·6–2·7 in. long, somewhat nodding, with rough branches. Spikelets lanceolate, ·3–·4 in. long, with 4–7 flowers, usually streaked with violet, less frequently pale, very rarely straw-yellow, short-stalked. Upper empty glume 1-veined, lower empty glume feebly 5-veined. Flowering glumes rather blunt, usually without awns, or with short prickles only. Flowers in July and August.

Locally on rocks, in meadows, pastures and open larch woods, widely distributed, especially in the Central and Southern Alps as far east as Lower Austria (not found in Bavaria), between about 4900 and 9850 ft., sometimes descending lower (found at sea-level at Locarno). A limestone-hater.

Pyrenees, Alps, Riesengebirge, Gesenke, Carpathians, Balkans, Asia Minor, Caucasus



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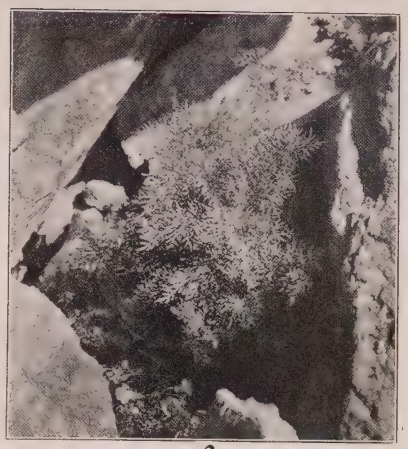

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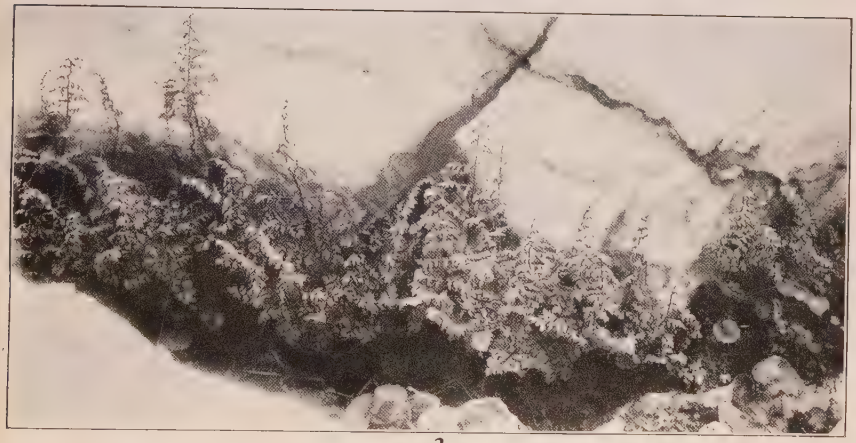

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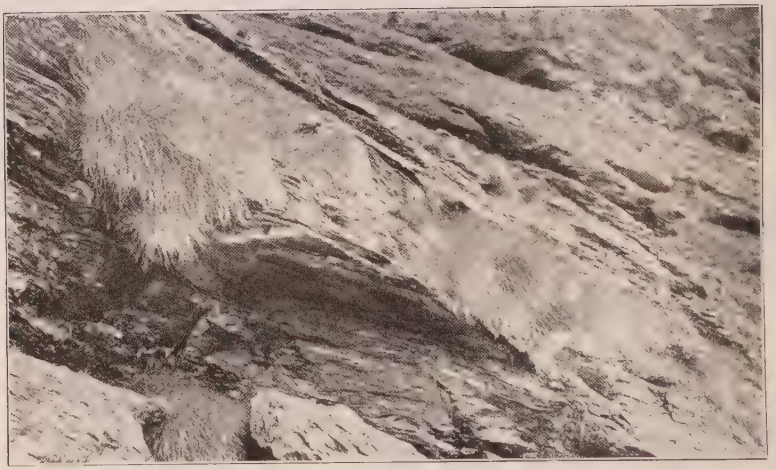

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This remarkable species of grass is one of the so-called "surface-growing plants" which can easily be detached from the rocks in the form of large luxuriant clumps. In high situations this plant often forms grassy expanses interspersed with small stair-like terraces and stretching for miles along steep slopes facing the south.

Fig. 4. **Sálix glaúca** L., *Filz-Weide* (Salicaceae).

A shrub 1–3 ft. high, with numerous rigid branches. Twigs brown to yellowish-brown, shining. Young shoots covered with long silky hairs. Leaves stalked, lanceolate to inversely egg-shaped, entire, usually shaggy with appressed silky hairs even when fully grown, light grey or white with down, later becoming bare and then dark green and somewhat shining above. Stipules small, hairy. Catkins appearing at the same time as the leaves, erect, cylindrical, up to 2 in. long, with the flowers crowded together. Bracts oblong to oval, blunt or rounded, variegated, covered with long light grey hairs. Stamens 2, more than twice as long as the bract: anthers oval, yellow, later becoming dark brown. Ovary short-stalked, white with long silky down. Flowers in June and July.

Occasionally found beside glacier streams and on damp slopes and moraines in the Western and Central Alps, from about 5900 to 8400 ft. Only on non-calcareous subsoils.

Alps (in Austria found only in Tirol; not found in Bavaria), Northern and Arctic Europe, Asia, and America.

Fig. 5. **Polýgonum Bistórta** L., *Schlangen-Knöterich*, Bistort, Snake-weed * (Polygonaceae).

Otterzung, Otterwurz (Bohemia), Nadanzung (Lower Austria), Schafzunge, Schafsblattla (Schwäbische Alb), Kalbszunge (Berne), Schaf-Lälleli, Würstli, Chölbli, Schluchä, Schluckere (Switzerland), Lämmerschwanz (Eastern Pomerania, Riesengebirge), Schlauche (Gotha), Badalest, Laungid d'bouv, Lungas bov (Romansch-speaking Grisons).

1 4 ft. high, sending out numerous runners. Rootstock thick, cylindrical, bent like a snake, covered with remains of leaves. Flower-stems lateral, with leaves at intervals, simple, bare. Lower stem-leaves egg-shaped or oblong, pointed, truncated or heart-shaped at the base, long-stalked; upper ones lanceolate or linear, sessile; all with wavy to crenate margins, dark green above, bluish-green below. Sheath formed by the stipules tube-shaped, brown, not slit, bare. Apparent spikes terminal, dense, cylindrical to oblong, up to 3·5 in. long. Perianth pale or dull pink, rarely white, about ·1 in. long. Stamens usually 8, projecting from the flower. Styles 3, distinct. Nut with three sharp edges, shining, deep chestnut brown, up to ·2 in. long, longer than the perianth. Flowers from May to August.

Locally common and usually gregarious in damp rich meadows, about herdsmen's huts, on the banks of streams and in marshes, from the plains up to sub-alpine levels, occasionally reaching 8200 ft.

Europe (not found in the south), Caucasus, temperate regions of Northern Asia, Himalayas, Arctic North America

This species is a typical plant of the mountains and lower alps, but is not altogether unknown in the lowlands. Its gregariousness is due to the fact that it throws out a large number of runners. The flesh-pink flowers are much visited by insects. In the Erzgebirge the leaves are used in vegetable soup.

Plate 35.

Fig. 1. **Cotoneáster integérrima** Medikus (— *C. vulgáris* Lindl.), *Gemeine Zwergmispel*, Common Cotoneaster * (Rosaceae).

An erect or trailing shrub 5–6½ ft. high, spreading, with rigid branches and smooth reddish-brown twigs. Leaves ·6–1·6 in. long and ·4–1 in. broad, broadly elliptical or almost rounded, pointed or blunt at the tip, green above, bare, pale green and downy below and along the edges. Flowers with their parts in fives, in drooping cymes of 1 4, on softly hairy (less frequently quite bare) stalks. Sepals bare, triangular, ·1 in. long, blunt, remaining reddish-brown. Petals 5, small, circular, white or reddish. Stamens 20; filaments reddish. Styles 2, less frequently 4 or 5. Spurious fruit a rounded, mealy, berry-like drupe with 2–5 stones, as much as ·3 in. across, bare, scarlet or purplish-red, rarely white. Flowers from April to June and occasionally again in August.

Fairly widely distributed, but not common; found in clefts of rocks, on rocky debris and boulders, in open woods and thickets and in expanses of dwarf bushes, from the foot of the mountains (rarely found in the plains) to the level of the alps, rising to 8650 ft. Most frequent on calcareous subsoils.

Europe (as far north as England, Southern Scandinavia, and Finland), the Near East, Siberia.

The similar species *Cotoneáster tomentósa* (Aiton) Lindl. has leaves white with down below and flower-stalks and calyx covered with woolly down.

Rhamnáceae. Buckthorn Order

Shrubs or trees with alternate or opposite entire leaves. Stipules small, deciduous, sometimes becoming thorns. Flowers small, inconspicuous, regular, greenish, yellowish, or white, with their parts in fours or fives, bisexual, or dioecious owing to the organs of one sex becoming atrophied, solitary or in clusters in the axils of the leaves. Sepals, petals, and stamens inserted into the edge of a cup formed by the expansion of the flower-stalk. Stamens 4 or 5, placed in front of the petals, which are very small, sometimes atrophied, often hood-shaped. Ovary superior, 3–5-celled, each cell containing one seed. Style undivided, with a knobbed stigma, or 2–3-cleft. Fruit resembling a capsule or drupe, usually many-celled.

Fig. 2. **Rhámnus púmila** Turra, *Zwerg-Kreuzdorn.*

A small, low-growing, spreading, thornless shrub, with gnarled branches close against the ground. Leaves indistinctly alternate, crowded together at the ends of the branches, oblong-inversely-eggshaped, pointed or rounded, with 7–8 (or even 4–13) pairs of veins on either side and finely serrate or almost entire margins, bare or sparsely haired below, short-stalked. Flowers usually with their parts in fours, whitish. Petals narrow, inconspicuous. Style 2–3-cleft. Fruit a small, bluish-black, almost globular drupe with 2–3 seeds. Flowers in June and July.

Fairly common in clefts of rocks, on precipices, and amongst boulders, from about 5250 to 10,000 ft., sometimes descending a long way (to 1150 ft. by the Lake of Lugano, and to 325 ft. near Riva on Lake Garda).

Main chain of the Alps (especially in the limestone Alps), mountains of Spain and Italy.

The root is deeply anchored in the clefts of the rocks, and the much-branched twigs, which are almost as brittle as glass, spread over the rocks in all directions, forming an interlacing trellis-work. The growth of the plant is exceedingly slow.

Fig. 3. **Eryngium alpínum** L., *Alpen-Mannstreu* (Umbelliferae).

A perennial 1–2½ ft. high, bare. Stem bearing one or more heads, erect. Radical leaves long-stalked, entire, egg-shaped, triangular, pointed at the tip, unequally serrate, the teeth ending in long bristles; upper leaves 3-lobed, uppermost leaves palmate, fringed, and serrate. Inflorescence like that of a thistle, forming a head, streaked with amethyst-blue. Bracts pinnate, much divided, with long bristles, prickly, serrate, longer than the cylindrical flower-head. Margin of calyx divided into 5 bristly teeth, which are longer than the white corolla. Fruit inversely egg-shaped, scaly. Flowers from July to September.

Locally at the bottom of corries, in bushy places, and on rocky pastures in the alps, up to 8200 ft. Not found in Bavaria. In Austria it is found in Carinthia (Hochstadl, Mussenalpe above Kötschach, Lamprechtskofel, Lesachtaleralpen, Plöcken, &c.) and in Vorarlberg (Upper Gamperdontal); also found in Carniola. In Switzerland especially frequent in the west (Lac de Taney, Champéry, Bourg St. Pierre, Dent de Morcles, Freiburgeralpen) and also on the "Distelband" on the Juchli Pass near Engelberg, Isental, Wandfluh near Nufenen, Gafiertal near St. Antönien.

Alps (from the Western Alps to Croatia), Balkans, summits of the Jura.

This handsome umbellifer of the Western Alps, which masquerades as a thistle, is easy to cultivate, and hence is found in peasants' gardens and in churchyards. In cold weather and during the night the bracts close over the club-like inflorescence.

Geraniáceae. Geranium Order

Annual or perennial plants with opposite or alternate leaves, which are palmate and more or less deeply cut, sometimes almost pinnate. Stipules may or may not be present. Flowers usually regular, bisexual, with their parts in fives, solitary or in cymes of two or more. Sepals and petals not united. Stamens 10, sometimes only 5 being fertile. Ovary superior, with a long beak, 5-celled, with two ovules in each cell; styles 5. Fruit splitting into 5 carpels, the beaks of which curl up and separate themselves from a persistent central axis.

Fig. 4. **Geránium silváticum** L., *Wald-Storchenschnabel*, Wood Crane's-bill.*

1–3 ft. high. Stem erect, sparsely covered with glandular hairs, especially towards the top. Leaves 5–9-cleft, with an angular outline, about twice as broad as they are long, with broadly-rhombic, unstalked segments. Flowers large, spreading like a wheel, growing in twos. Flower-stalks always erect. Sepals rather blunt, with an abruptly-terminating bristle. Petals truncate or notched, reddish-violet. Stamen-filaments lanceolate, gradually tapering. Beaks of fruit covered with silky or glandular hairs. Flowers from June to August.

Fairly widely distributed in woods, rich meadows, amongst mountain pine and at the bottom of corries, from the plains up to the level of the alps (to 8200 ft.).

Temperate regions of Europe and Asia.

Plate 36.

Fig. 1. **Campánula excísa** Schleicher, *Ausgeschnittene Glockenblume* (Campanulaceae).

2–5 in. high, sending out short creeping stems, forming a loose carpet. Stems numerous, curved and ascending or erect, with sharp edges, usually covered with projecting hairs below, less frequently bare, usually bearing one flower (less frequently 2–5). Leaves bare or somewhat hairy; radical leaves stalked, almost circular, heart-shaped, lower stem-leaves linear-lanceolate. Flowers long-stalked, terminal, nodding. Calyx bare, with pointed, thread-like, spreading tips. Corolla light bluish-lilac, tube-shaped, ·8–1·4 in. long, much longer than the calyx, cleft almost half the way down into 5 triangular-eggshaped teeth, with blunt, broadly rounded hollows between them.

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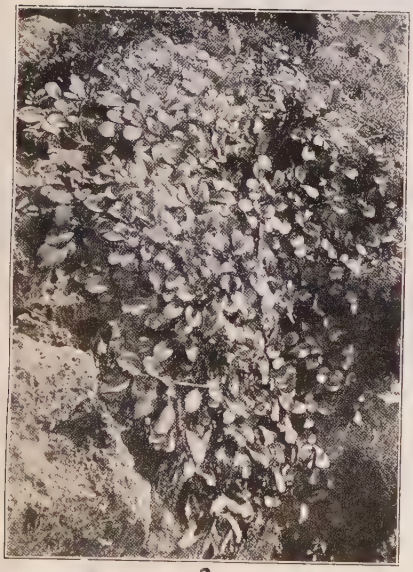

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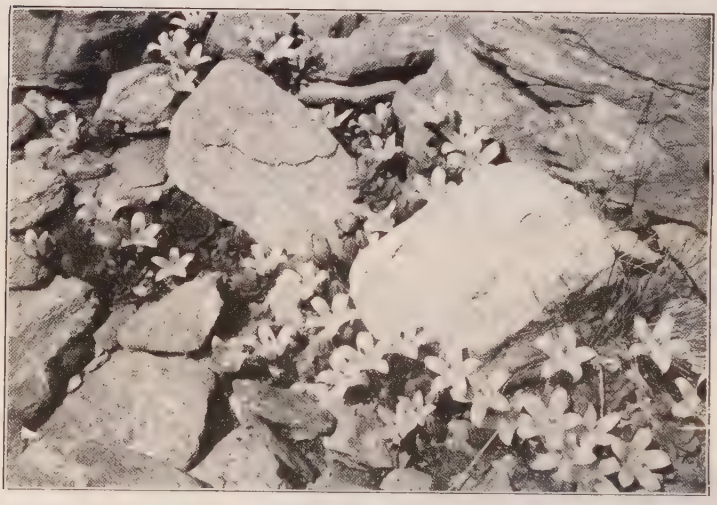

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Capsule nodding, with numerous flat seeds. Flowers from June to September.

In clefts of rocks and on heaps of debris and river gravel, from 4600 to 7675 ft.; on gneiss and granite. In Switzerland found only in the Valais and Ticino; it also occurs in the Western Alps, Bergamasque Alps, and Cadorische Alps.

Fig. 2. **Campánula Cenísia** L., *Mont Cenis-Glockenblume.*

·4–2 in. high. Rootstock slender, much branched, creeping extensively, sending out small stems bearing rosettes. Leaves bluish-green, somewhat fleshy, fringed with long hairs, broadly spatula-shaped, entire; upper leaves broadly lanceolate. Flowers solitary, terminal, almost sessile. Calyx divided into broad lanceolate teeth, densely covered with long hairs. Corolla light blue, rarely white, spreading in a wide bell, ·4–·8 in. across, cleft almost half-way down into eggshaped-lanceolate, pointed, fringed teeth. Style light blue, usually longer than the corolla. Flowers in July and August.

Occasionally found on debris, among boulders, and on ridges of rock in high alpine regions, from 6250 to 10,150 ft. Found only in Switzerland, Vorarlberg, and Northern Tirol (to Wattental). Prefers limestone.

Fig. 3. **Campánula thyrsoídes** L., *Strauss-Glockenblume.*

Maadkerze (Bernese Oberland).

4–20 in. high, biennial. Root thick, fleshy, sending out one or more shoots. Stem erect, unbranched, with sharp edges, stiffly-haired, with numerous leaves. Leaves oblong to tongue-shaped, rounded or slightly tapering at the tip, with entire or slightly wavy margins and covered with stiff hairs. Flowers in a dense club-shaped spike interspersed with bracts; spike lengthening later. Calyx-teeth linear, blunt, bristly. Corolla cylindrical-bellshaped, ·7–·8 in. long, yellowish-white, covered with woolly hairs, especially along the veins. Flowers in July and August.

Locally in unmanured meadows, on rocks and boulders and among rocky debris in the Alps and Swiss Jura, from 5250 to 8900 ft., sometimes even lower (to 4650 ft.). On limestone and schists.

This remarkable yellow-flowered *Campanula* is one of the few "biennials" among alpine plants. The egg-shaped seed falling to the ground in the autumn produces in the following year a large flat rosette of leaves which lie close to the ground, with a root resembling that of a turnip and containing a reserve of nutriment. In the next year the flower-stem, which may be nearly 20 in. high and is thick and cylindrical at the end, shoots out from the middle of the rosette. Once the seed has been ripened the plant dies.

Plate 37.

Fig. 1. **Achilléa moschàta** Wulfen (= *A. Genipi* Murr), *Bisam-Schafgarbe* (Compositae).

Alm- or Jochkamille, Frauenraute (Tirol), Wilsmaskraut (Carinthia), Wildfräuleinkraut, Iva (Grisons), Plaunta d'iva, Flur d'iva (Engadine), Gratreifeni (Valais).

2·75–8 in. high. Rootstock branching, usually creeping extensively. Stem erect, simple, hairy above. Leaves green, somewhat hairy, thickly dotted with glands, elliptic to oblong, simply pinnatifid, with simple (very rarely 2–3-cleft) linear segments arranged like the teeth of a comb; lower leaves short-stalked, upper leaves sessile. Inflorescence a simple corymb of 3–25 flowers. Heads 4–5·5 in. across, stalked, with lanceolate chaffy scales. Involucre bell-shaped, hairy; bracts keeled, green, with a brown or black membranous margin. Ray and disk florets whitish. Flowers from July to September.

Widely distributed, but local; found in clefts of rocks, on boulders, moraines, heaps of debris, dry poor meadows, less frequently on heaths, and in thickets and larch and spruce woods, in the Alps, from 5250 to 9850 ft. (or even 11,150 ft.), very occasionally descending even farther (to 925 ft., near Bolzano). On non-calcareous rocks only. Not found in Bavaria, Upper Austria, Lower Austria, or Carniola.

On calcareous soil *Achillea atrata* L. (Plate 28, fig. 5) takes the place of *Achillea moschata*. The latter plant has a pleasantly aromatic smell and a strong aromatic flavour; it is gathered when in flower and carefully dried, and is then used, as it has been for centuries, as a digestive tonic and sudorific for loss of appetite, spasms, &c.; it is also used as an external application for wounds. The *Ivabitter* (*Malojabitter*) and *Iva* liqueur made from this and other aromatic alpine plants are well known.

Fig. 2. **Chrysánthemum coronopifólium** Vill. (= *Ch. atrátum* Jacquin), *Sägeblätterige Wucherblume* (Compositae).

4–16 in. high. Stem simple, bare, bearing a solitary flower-head. Leaves somewhat fleshy, fragile, bare, dark green; lower leaves stalked, wedgeshaped-oblong, broadening at the tip, with 3–7 coarse serrate teeth; intermediate and upper leaves oblong-lanceolate to linear, narrow, deeply serrate, with pointed lanceolate teeth at wide intervals, usually bending outwards. Flower-heads 1·2·5 (or even 3·5) in. across, with a hemispherical involucre. Scales of involucre overlapping, green, with a broad black membranous edge. Disk florets golden-yellow; ray florets linear, white. All the fruits have pappus-like calyx-margins. Flowers from July to September.

Fairly common among boulders, on grass-grown debris, landslides, watercourses, and hollows in the snow in the limestone Alps, between 4900 and 12,600 ft., sometimes descending even lower (to 1300 ft.). Absent from great stretches of country in the Central and Southern Alps.

In the limestone Alps this species takes the place of the limestone-hating *Chrysánthemum alpinum* L. (Plate 28, fig. 7).

Fig. 3. **Carlína acaúlis** L., *Silber-* or *Wetterdistel*, *Eberwurz* (Compositae).

Silberwurz, Frauadistel (Schwäbische Alb), Käsdorn (Grisons), Oanhag'n, Wetterrosen (Bavaria, Austria), Dornrosen, Wiesenkäs, Sunnrosen (Carinthia), Dunderwurzle, Saudistel (Baden), Jagerbrot (Styria), Sonnenwenddistel (Lower Austria), Groffels, Braschunin (Romansch-speaking Grisons), Stächer, Neustächer (St. Gallen).

2–4 in. high. Stem usually very short, almost always simple and bearing a solitary flower-head. Leaves usually all springing from the root, in a rosette, rather stiff, bare or with a loose spider's web of hairs below, stalked, with an oblong outline, once or twice pinnatifid, with 10–12 pairs of segments edged with spiny teeth. Flower-heads springing from the root, very large, 2 5 in. across. Outer bracts of involucre greenish, resembling leaves, with prickly teeth, spreading; inner bracts linear, tapering, parchment-like, shining and silvery. Flower-heads with dirty-white slit chaffy scales. Flowers whitish or reddish. Fruits oblong-cylindrical, covered with appressed hairs, with feathery pappus. Flowers from June to September.

Widely distributed in dry meadows, cattle pastures, and open woody places, from the plains to the level of the alps, to 8150 ft. Widely distributed in Southern and Central Europe.

The flower-heads close during the night and in damp weather, and therefore act as a weather-glass. The marrow-like receptacle, like that of the artichoke, is edible and tastes like almonds or hazel-nuts. The plants are sometimes dug up and mixed with the hay.

Fig. 4. **Arónicum** (*Dorónicum*) **Clúsii** Koch, *Zottige Gemswurz* (Compositae).

3–16 in. high. Rootstock creeping, tasteless, covered with glandular hairs. Stem hollow, erect, bearing a solitary flower-head. Leaves fringed with hairs, but without glands; radical leaves oblong to lanceolate, sometimes oval, with entire or wavy margins, tapering into the stalk, which is much shorter than the leaf; intermediate and upper leaves half clasping the stem, sessile. Flower-heads 1·8–2 in. across, golden-yellow. All the fruits with a hair-like pappus. Flowers in July and August.

Locally on screes and damp rubbish, and amongst melting snow in high alpine regions, from 6550 to 9950 ft. Avoids limestone. Not found in Bavaria, the Hohe Tauern, Carinthia, or Carniola.

Like the similar species, *Arónicum scorpioides* Koch (Plate 29, fig. 1), which is very common on limestone, this plant is greedily sought after by goats and chamois.

Fig. 5. **Senécio uniflórus** All., *Einköpfiges Kreuzkraut* (Compositae).

2–6 in. high, snow-white with down. Rootstock branching, short. Stem erect or ascending, bearing only a few leaves and usually only one flower-head, downy with appressed white hairs. Leaves snow-white with down above and below; lower leaves egg-shaped, coarsely cut and crenate, gradually tapering into the long stalk; upper leaves linear, entire. Flower-heads terminal, ·8–1 in. across, deep yellow to orange. Bracts of involucre almost forming two complete rows, brownish, linear. Fruits short-haired, with a pappus. Flowers from July to September.

Found on stony pastures and rocks in high alpine regions, up to 11,000 ft.; on primitive rocks. Found only in the Southern Pennine Alps from the Weisshorn and Zermatt to the Simplon, in Savoy, and in the adjacent parts of Northern Italy as far as Lago Maggiore.

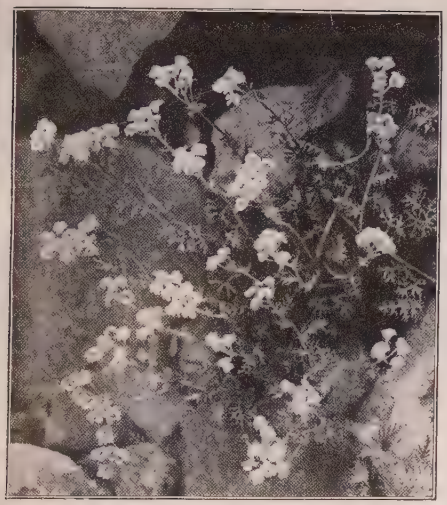

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Fig. 1. **Rhapónticum scariósum** Lam. (= *Centauréa Rhapónticum* L., = *Serrátula Rhapónticum* DC.), *Alpen-Scharte* (Compositae).

Gross-Trummächnebel, Schafzungen (Switzerland).

A handsome shrub, 1–3 ft. high. Stem thick, strong, simple, bearing a solitary flower-head, covered with a spider's web of hairs, sometimes without leaves towards the top. Leaves bare above, green, covered with grey down below; radical leaves long-stalked, more than a foot long and 4–6 in. broad, oblong-eggshaped, tapering, heart-shaped at the base, with sharp, uneven teeth; upper leaves egg-shaped to oval-lanceolate, entire or lyrate, toothed, half clasping the stem. Flower-heads terminal, as large as one's fist (2–4·2 in. across). Involucre globular; bracts of involucre oblong, with a broad brown circular membranous appendage with an irregularly cut edge. Chaffy scales present. Flowers reddish-pink to purple; marginal florets not spreading. Fruits shorter than the reddish pappus, in which the innermost row of bristles is the longest. Flowers in July and August.

Locally amongst bushes, in rich meadows, and in thickets at subalpine and alpine levels in the alps and lower alps, from 4900 to 6900 ft. Not found in Bavaria. In the Eastern Alps found only in Rhätikon, Southern Tirol, Carniola, and Gorizia in the region of the Julian Alps (Mohorz). Fairly widely distributed in Switzerland.

Main chain of the Alps, from Dauphiny to Carniola.

Fig. 2. **Círsium spinosíssimum** (L.) Scop., *Gelbe Alpen-Distel* (Compositae).

Oanhak'n (Upper Styria), Einhacke (Carinthia), Wissdorn (Grisons), Stüpfi (Switzerland).

8–20 in. (or even 4 ft.) high. Roots very strong. Stem branched but little or not at all, with leaves up to the top, yellowish-green, bare or sparsely haired. Leaves green on both sides, with a thin spider's web of woolly hairs, oblong, wavy-pinnatifid, with 7–8 pairs of sharp, spiny, toothed segments; upper leaves sessile, heart-shaped at the base. Flower-heads crowded together at the ends of the stems, surrounded by numerous pale yellow, slightly tapering, thorny, wavy-toothed bracts. Bracts oval-lanceolate, ending in a long, powerful thorn. Flowers from July to September.

On damp, rich pastures, banks of streams and pastures at the level of the alps, from 5250 to over 9850 ft.

Pyrenees, Alps (from France to Lower Austria and Carniola).

This handsome plant is regarded as a troublesome, space-grabbing weed in pastures. It forms hybrids with some other species (e.g. with *Cirsium oleraceum* [L.] Scop. and *C. palustre* [L.] Scop.).

GLOSSARY

Achene, a small, dry, hard, one-seeded fruit, formed from one carpel, often resembling a seed, not bursting open.
Alluvium, a deposit of earth, sand, &c., laid down by water.
Alternate (of leaves, &c.), not opposite to each other, but arranged singly at different heights.
Annual, lasting only one year.
Anther, the part of a stamen which contains the pollen.
Appressed (hair), lying flat.
Ascending, rising somewhat obliquely, or curving upward.
Awn, a bristle-shaped appendage, e.g. on the glumes of Grasses.
Axil, the angle formed by a leaf or branch with the stem.
Axillary, growing in an axil.
Bacterial tubercles, swellings on the roots of leguminous plants, filled with bacteria which enable the plants to utilize the nitrogen of the air.
Bare, not hairy.
Barren, incapable of producing fruit; sterile.
Beak, a pointed projection.
Berry, a fleshy or pulpy fruit with seeds immersed in the pulp, such as the Gooseberry.
Biennial, lasting for two years.
Bilateral symmetry (flowers with), divisible by only *one* line into similar halves.
Bisexual, having both stamens and pistils.
Blade (in grasses), see **Lamina.**
Bloom, a white waxy covering found on many fruits and leaves.
Bract, the leaf in the axil of which a flower-bud arises.
Bracteole, a small extra bract at the base of an individual flower.
Bracts, general, the bracts at the base of a general umbel (q.v.).
Bracts, partial, the bracts at the base of a partial umbel (q.v.).
Bulb, a subterranean leaf-bud with fleshy scales or coats: cf. **Corm.**
Bulbil, see p. 3.
Calcareous, containing a large proportion of lime.
Calyx, the outer part of the perianth of a flower.
Capsule, a dry seed-vessel which finally splits open, formed from more than one carpel.
Carpel, a simple pistil or one member of a compound pistil.
Cartilaginous, firm and tough.
Caruncle, a wart or protuberance on a seed.
Catkin, a scaly spike, usually drooping, with unisexual flowers destitute of petals.
Chalk-gland, a gland which deposits calcareous matter, as in certain Saxifrages.
Chlorophyll, the green colouring matter of plants.
Claw, the narrow base of a petal, as e.g. in the Pink.
Compressed, flattened, especially laterally.
Corm, the enlarged fleshy base of a stem, bulb-like but solid.
Corolla, the inner part of the perianth of a flower.
Corona, an inner appendage to a petal, or to the throat of a corolla, as e.g. in the Daffodil.
Corymb, an inflorescence in which the flowers arising lower down the stem have longer stalks, so that the inflorescence has a flat or nearly flat top. Cf. **Cyme, Raceme.**
Cotyledons, the first leaves of the embryo plant.
Creeping, running along at or near the surface of the ground, rooting here and there.
Crenate, scalloped, having rounded teeth.
Culm, see p. 3.
Cyme, an inflorescence in which the central or terminal flowers expand before the outer or lower ones: cf. **Corymb, Raceme.**
Cyme, helicoid, a coiled cyme with the flowers all on the same side of the main flower-stem.
Cyme, scorpioid, a coiled cyme with successive flowers on alternate sides of the main flower-stem.
Deciduous, not evergreen; not persistent.
Dimorphous, see p. 39.
Dioecious, unisexual, with the two kinds of flowers on separate plants.
Disk, the central flowers (as opposed to the **Ray**) of a Composite flower-head.
Distant, at wide intervals.
Distichous, see p. 3.
Distinct, separate, not united.
Drupe, a stone-fruit, such as the Plum.
Entire, without toothing or division.
Erect, growing straight up.
Fertile, capable of producing fruit.
Filament, the part of a stamen which supports the anther.
Floret, a small flower, usually one of a dense cluster or head, as in the *Compositae.*
Flower, the part of the plant adapted for reproduction.
Follicle, a fruit consisting of one carpel, opening down one side.
Frond, the leaf of a fern.
Fruit, the mature ovary containing the fertilized ovule or ovules (**seeds**), together with adjacent parts inseparably connected with it.
Fruit, collective, a fruit formed from the ovaries of several flowers, e.g. the Pineapple.
Fruit, spurious, a fruit including parts other than those mentioned above (see **Fruit**), e.g. the Strawberry.
N.B.—Many fruits in the popular sense are not so in the botanical.

Gland, a secreting surface or structure, any protuberance or appendage having the appearance of such an organ.
Glume, a chaff-like bract.
Glume, empty, one of the glumes at the base of a spikelet in the inflorescence of grasses.
Glume, flowering, in grasses, a glume which encloses the flower.
Gregarious, growing in company.
Habit, the general appearance of a plant.
Habitat, the kind of locality in which a plant grows.
Head, a dense cluster of sessile or nearly sessile flowers on a very short stalk or receptacle.
Herb, a plant with no persistent woody stem above ground.
Herbaceous, having the properties of a herb.
Heterostylism, see p. 39.
Host, a plant which nourishes a parasite.
Humus, decaying organic matter in soil.
Hybrid, a cross breed between two species.
Incised, sharply and irregularly cut.
Indigenous, native to the country; not introduced (cf. **naturalized**).
Indusium, see p. 65.
Inferior (of the ovary), situated below the other floral parts.
Inflorescence, the arrangement of the flowers on the flower stem; the flowers collectively.
Inflorescence, one-sided, an inflorescence in which all the flowers are turned to one side.
Inversely egg-shaped, egg-shaped, with the broader end at the tip; and similarly for other cases.
Involucre, a ring of bracts surrounding a flower-cluster or head or a single flower.
Keeled, with a keel-like ridge.
Labiate, lipped, usually 2-lipped.
Lamina (in grasses), see p. 3.
Lanceolate, shaped like a lance-head, several times longer than broad, widest above the base and narrowing towards the extremity.
Leaf, compound, a leaf divided into distinct parts or leaflets.
Ligule (in grasses), see p. 3.
Limb, the border of a corolla in which the petals are united, as distinct from the tube; the main part of a petal, as distinct from the claw.
Linear, long and narrow.
Lomentum, see p. 23.
Lyrate, lyre-shaped, pinnatifid with a large and rounded terminal lobe, the lower lobes being small.
Midrib, the principal vein of a leaf.
Monoecious, with stamens and pistils in separate flowers on the same plant.
Naturalized, of foreign origin, but established and reproducing itself as though it were indigenous (q.v.).
Nectar, a sweet fluid secreted by various parts of plants and forming the chief source of bees' honey.
Nectary, any place or organ where nectar is secreted.
Nerve, a vein or slender rib.
Neuter, having neither stamens nor pistils.
Nodding, bent downwards, but not so much as if drooping.
Node, the place or ring upon a stem where there is normally a leaf or a whorl of leaves.
Nut, a hard, one-seeded fruit which does not split open.
Oblong, longer than broad, with nearly parallel sides.
Oblong-linear, of a shape intermediate between **oblong** and **linear;** and similarly for other cases.
Ovary, the part of the pistil which contains the ovules.
Ovule, the organ which after fertilization becomes a seed.
Ovuliferous, bearing ovules.
Palate, a projection of the lower lip of a two-lipped corolla, closing the throat (as in the Antirrhinum).
Palmate (leaf), a compound leaf in which the leaflets are attached to the extremity of the leaf-stalk and spread like the fingers of a hand.
Palmately lobed (leaf), a simple leaf divided so as to resemble a hand with the fingers spread.
Panicle, a branched or compound raceme.
Papilionaceous, butterfly-shaped; see p. 32.
Papillose, bearing minute nipple-shaped projections.
Pappus, the tuft of hairs or bristles at the top of the fruits of *Compositae*, &c. (as in the "dandelion puff"); see p. 53.
Parasite, an organism which subsists on another (called the **host**).
Perennial, lasting several years.
Perianth, the floral envelope, the calyx or corolla, or both; usually applied when the calyx and corolla are not readily distinguishable from each other.
Perigone, same as **Perianth.**
Persistent, lasting a long time.
Petal, a division of the corolla.
Petaloid, resembling a petal.
Pinnate (leaf), a compound leaf with leaflets arranged along either side of a common leaf-stalk.
Pinnate, interruptedly, pinnate, having the pairs of leaflets alternately large and small.
Pinnate, unequally, pinnate, ending in an odd leaflet.
Pinnatifid, pinnately divided, but not so far as to have separate leaflets.
Pistil, one of the female or seed-bearing organs of the flower, consisting of ovary, stigma, and style (when present).
Pod, a dry, many-seeded fruit which splits open down the back and down the front.
Pollen, the fertilizing dust-like powder produced by the anthers of flowering plants.

Pollination, the transfer of pollen to the stigma.
Pouch, a short pod, nearly as broad as it is long.
Prickle, a small sharp outgrowth from the bark or rind, only skin deep and easily separable from it: cf. **Thorn.**
Primitive rocks, crystalline rocks of the Archæan or oldest known system of rocks.
Prostrate, lying flat on the ground.
Raceme, a stalked inflorescence in which the youngest flower is at the top: cf. **Corymb, Cyme.**
Radical, springing from the root.
Ray, the marginal flowers (when distinct from the **Disk**) of a Composite flower-head.
Receptacle, the part of a flower-stalk which bears all the floral parts (sepals, petals, &c.).
Recurved, curled backwards.
Reflexed, bent backwards.
Regular (flower), divisible by *many* lines into similar halves.
Resupination, see p. 8.
Rhizome, same as **Rootstock** (q.v.).
Rib, a vein of a leaf, especially if prominent.
Root, the part of a plant which grows downwards, mostly developed underground and absorbing moisture, &c., from the soil.
Roots, adventitious, roots arising from any part of a plant other than the main root or its branches.
Rootstock, any prostrate or subterranean stem, usually rooting at the nodes and becoming erect at the extremity.
Runcinate, see p. 59.
Runner, an elongated lateral shoot, rooting here and there, as in the Strawberry.
Scape, a leafless flower-stalk rising from the ground.
Schistose rocks, crystalline metamorphic rocks arranged in layers.
Seed, the ripened ovule, consisting of the embryo and its coatings: cf. **Fruit.**
Semi-parasite, a plant which contains chlorophyll and makes its own carbonaceous food, but which taps its host for water.
Sepal, a division of the calyx.
Serrate, saw-edged.
Sessile, having no stalk.
Shaggy, covered with long weak hairs.
Sheath (in grasses), see p. 3.
Shrub, a woody perennial, smaller than a tree.
Solitary, single, isolated.
Sori, see p. 65.
Spike, a form of simple inflorescence in which the flowers are sessile upon a more or less elongated common stalk.
Spikelet, a small or secondary spike; in particular, one of the small bracted spikes of a few flowers which make up the compound inflorescence of Grasses and Sedges.
Sporangium, see p. 65.
Spore, a reproductive cell.
Spur, a hollow, sac-like or tubular extension of some part of a flower, usually containing nectar.
Stamen, one of the male or pollen-bearing organs of the flower.
Staminodium, see p. 25.
Stellate (hair), spreading like a star.
Stem, the part of a plant which grows upwards.
Stem, simple, an unbranched stem.
Sterile, same as **Barren.**
Stigma, that part of the pistil which receives the pollen.
Stipules, appendages at the base of the leaf-stalk, always occurring in pairs.
Style, the (usually attenuated) part of the pistil connecting the stigma and ovary.
Stylopodium, see p. 36.
Subshrub, a small shrub with partially herbaceous stems.
Superior (of the ovary), situated above all the floral parts.
Taproot, a main root growing straight downwards.
Terminal, at the extremity of the stem.
Ternate, having three leaflets, as e.g. in Clover.
Thorn, a branch or leaf modified to form a spine: cf. **Prickle.**
Toothed, having small marginal lobes resembling teeth.
Transpiration, the emission of water in the form of vapour from the green tissues of plants.
Triennial, lasting for three years.
Truncate, ending abruptly, as if cut off transversely.
Tuber, a short, thick subterranean stem with numerous buds or eyes: cf. **Bulb, Corm.**
Twice ternate, having three leaflets, each of which consists of three leaflets; and similarly for other cases.
Umbel, an inflorescence in which a number of flower-stalks spring from the same point, like the ribs of an umbrella.
Umbel, general or **compound,** an umbel in which each ray itself bears a umbel.
Umbel, partial or **simple,** an umbel in which each ray bears one flower only.
Umbo, a rounded elevation or boss, as on the cone scales of certain Pines.
Unisexual, of one sex, bearing stamens only or pistils only.
Utricle, see p. 4.
Valve, one of the pieces into which a capsule splits.
Vernation, see p. 40.
Viviparous, see p. 3.
Whorl, an arrangement of leaves, flowers, &c., in a circle round the stem.
Wind-fertilized (plant), a plant in which the pollen is carried to the stigma by the wind.
Wing, any thin or membranous expansion bordering or surrounding an organ.

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